

Highway 1 Soquel to Morrissey Auxiliary Lanes Project Santa Cruz County, California

Water Quality Study Report



Prepared for:




September 2008

**Highway 1 Soquel to Morrissey Auxiliary Lanes Project
Santa Cruz County, California**


Water Quality Study Report

Submitted to:
California Department of Transportation

This report has been prepared by or under the supervision of the following Registered Engineer. The Registered Civil Engineer attests to the technical information contained herein and has judged the qualifications of any technical specialists providing engineering data upon which recommendations, conclusions, and decisions are based.



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Executive Summary

The purpose of the Highway 1 Soquel to Morrissey Auxiliary Lanes Project (hereto known as the “Soquel to Morrissey Auxiliary Lanes Project”) is to improve traffic conditions for weaving and merging movements on Highway 1 between Soquel Drive and Morrissey Boulevard. The Soquel to Morrissey Auxiliary Lanes Project consists of adding 1 mile (1.6 km) of auxiliary lanes along Highway 1 in Santa Cruz County, California. The alternatives under consideration include one Build and a No-Build Alternative.

The purpose of this Water Quality Study Report is to evaluate the potential for water quality impacts to existing surface watercourses and ground water resources within the Soquel to Morrissey Auxiliary Lanes Project limits. The general approach of the Project is to avoid or minimize impacts and to implement measures for any unavoidable impacts. The components of this study will include any proposed activity that may result in impacts to water resources, erosion of the stream banks, or potential increases in sediment load and other pollutants to surface and ground waters.

The Soquel to Morrissey Auxiliary Lanes Project is located in Northern California, which has a rainy season from October 15th through April 15th. Water resources within the Project are under the jurisdiction of the Central Coast Regional Water Quality Control Board (CCRWQB). Four waterways cross Highway 1 along the Project reach: Arana Gulch and three tributaries. Existing United States Army Corps of Engineers’ (USACOE) wetlands and other waters, as well as Department of Fish and Game jurisdictional areas are within the Project’s Biological Study Area. The *Highway 1 Soquel to Morrissey Auxiliary Lanes Project Wetland Assessment* (2008) Report includes maps which delineate these resources. The Soquel to Morrissey Auxiliary Lanes Project does not directly flow into California Coastal Commission areas and is not located in any Areas of Special Biological Significance (ASBS) that requires protection of species or biological communities. In addition, formal Section 7 consultation between Federal Highway Administration (FHWA) and National Marine Fisheries Service (NMFS) is not anticipated since the project design has been updated to avoid impacts to Arana Gulch, and will only affect ephemeral tributaries that do not support steelhead habitat.

Soils groups within the Soquel to Morrissey Auxiliary Lanes Project limits include groups B, C, and D, indicating that the area has medium to low infiltration rates. Groundwater was encountered at a shallow depth, an elevation of 95 feet, at the Morrissey Overcrossing. No data was available at the Soquel Avenue OC, according to the Preliminary Geotechnical Report (February 2008).

The Soquel to Morrissey Auxiliary Lanes Project has a potential for water quality impacts due to suspended solids being introduced into the waterways from construction activities or from additional runoff from added impervious areas. Storm water runoff from Highway 1 corridor potentially carries pollutants into natural flowing streams as well as into adjacent jurisdictional biotic and aquatic areas. The total Disturbed Soil Area

(DSA) for the Soquel to Morrissey Auxiliary Lanes Project is 5 ac (1.71 ha) and total added impervious area is 1.75 ac (0.72 ha). Pollutants from storm water runoff will be minimized by the use of construction site Best Management Practices (BMPs), design pollution prevention BMPs, and treatment BMPs. Consideration of BMPs is required by the California Department of Transportation's (Caltrans') National Pollutant Discharge Elimination System (NPDES) Permit (99-06-DWQ) issued July 15, 1999 by the California State Water Resources Control Board (SWRCB).

Temporary Best Management Practices (BMPs) will be considered for this Soquel to Morrissey Auxiliary Lanes Project to prevent potential water quality degradation during construction. Short term impacts may be anticipated from construction activities such as grading work or dewatering. Permanent treatment and design pollution prevention BMPs will be considered to address permanent water quality impacts associated with additional impervious areas and to try to reduce erosion and collect and treat roadway runoff. In addition, the design goal for the Project is to maintaining pre-construction storm water discharge flows by metering or detaining these flows to preconstruction rates prior to discharge to a receiving water body or Municipal Separate Storm Sewer Systems (MS4).

Water quality will also be impacted by proposed fill to other Waters of the U.S. Retaining walls are proposed along Highway 1, adjacent to Arana Gulch, to protect and minimize wetland loss in this area. Mitigation for unavoidable impacts to other Waters will be addressed through consultation with appropriate regulatory agencies.

Overall, the Soquel to Morrissey Auxiliary Lanes Project's overall design goal will be to avoid water resources to the Maximum Extent Practicable (MEP), to maximize treatment of storm water runoff, and to reduce erosion by metering or detaining post-project runoff rates to pre-project rates. By meeting these goals and after incorporating other applicable NPDES requirements, water quality impacts should be minimized and therefore, not significant.

Acronyms

ASBS	Areas of Special Biological Significance
BATEA	Best Available Technology Economically Achievable
BCT	Best Conventional Technology
BMPs	Best Management Practices
CCA	Critical Coastal Areas
CCC	California Coastal Commission
CCRWQCB	Central Coast Regional Water Quality Control Board
CDFG	California Department of Fish and Game
COMM	Commercial and Sport Fishing
COP	California Ocean Plan
COLD	Cold Freshwater Habitat
CWA	Clean Water Act
DHS	Department of Health Services
DSA	Disturbed Soil Areas
EPA	Environmental Protection Agency
ESAs	Environmentally Sensitive Areas
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FIS	Flood Insurance Study
FRESH	Freshwater Replenishment
GWR	Ground Water Recharge
HR	Hydrologic Region
RTP	Regional Transportation Plan
MEP	Maximum Extent Practicable
MIGR	Migration of Aquatic Organisms
MS4	Small Municipal Separate Storm Sewer Systems
MUN	Municipal and Domestic Supply
NOC	Notice of Construction
NPDES	National Pollutant Discharge Elimination System
OHWM	Ordinary High Water Mark
RARE	Rare, Threatened, or Endangered Species
REC-1	Water Contact Recreation
REC-2	Non-Contact Water Recreation
RWQCB	Regional Water Quality Control Boards
SPWN	Fish Spawning
SCWD	Santa Cruz Water Department
SWAMP	Surface Water Ambient Monitoring Program
SWPPP	Storm Water Pollution Prevention Plan
SWRCB	State Water Resources Control Board
SWMP	Statewide Storm Water Management Plan
TMDLs	Total Maximum Daily Loads
TKN	Total Kjeldahl Nitrogen
TSS	Total Suspended Solids

USACOE	United States Army Corps of Engineers
USDA	United States Department of Agriculture's
US EPA	United State Environmental Protection Agency
USFS	United States Forest Service's ecological sub region
WILD	Wildlife Habitat
WQA	Water Quality Act

1 PROJECT DESCRIPTION

The proposed project extends for a distance of 0.98 mile from the southbound Soquel Avenue off-ramp to the northbound Morrissey Boulevard on-ramp (post mile 14.96 to post mile 15.94) in the City of Santa Cruz, Santa Cruz County, California. Maps of the project vicinity and location are included below in Figures 1& 2.

1.1 Project Purpose

The purpose of the Soquel to Morrissey Auxiliary Lanes Project is to improve traffic conditions for lane-changing and merging movements on Highway 1 between Soquel Avenue and Morrissey Boulevard and improve pedestrian and bicycle access and safety.

1.2 Project Need

Identified needs include recurrent congestion from impeded lane-changing and merging movements, queuing traffic from the southbound bottleneck at the La Fonda Avenue overcrossing, and limited pedestrian and bicycle access crossing Highway 1 in the project area.

1.3 Alternatives

Two alternatives are under consideration: one Build Alternative and the No-Build Alternative.

1.3.1 Build Alternative

The Build Alternative would add one 12-foot-wide auxiliary lane from the Soquel Avenue on-ramp to the Morrissey Boulevard off-ramp in the northbound direction and extend a 12-foot-wide lane from about 500 feet north of the La Fonda Avenue overcrossing to the Soquel Avenue off-ramp in the southbound direction, with 10-foot outside shoulders between the Soquel Avenue and Morrissey Boulevard interchanges. An auxiliary lane extends from the on-ramp of one interchange to the off-ramp at the next interchange and is designed to separate traffic movements entering and exiting the freeway from mainline traffic. It is not designed for use by through traffic. The project also would replace the La Fonda Avenue overcrossing.

A typical auxiliary lane would be constructed northbound from the Soquel Drive on-ramp to the Morrissey Boulevard northbound off-ramp (0.7 mile). On southbound Highway 1, the new outside lane being constructed with the State Route 1/ State Route 17 Merge Lanes Project would be extended from north of the La Fonda Avenue overcrossing to the Soquel Avenue exit ramp (0.3 mile). This lane would be "exit only" at Soquel Avenue, and the widening would eliminate the outside lane-drop north of La Fonda. No changes would be made to the Soquel Avenue or Morrissey Boulevard ramps. Retaining walls are proposed at several locations to reduce the amount of earthwork required, keep the improvements within the existing highway right-of-way and minimize impacts to

wetlands and other waters of the U.S. Soundwalls found to be feasible and reasonable based on current cost estimates also are recommended.

Additionally, the La Fonda Avenue overcrossing would be replaced and widened to accommodate the proposed auxiliary lanes. The new bridge would provide for two 12-foot-wide traffic lanes, as well as five-foot-wide bicycle lanes and six-foot-wide pedestrian sidewalks in both directions.

The project also would demolish the existing La Fonda Avenue overcrossing and existing roadway shoulder, and require earthwork and fill and temporary easements for construction of the overcrossing replacement and a temporary pedestrian/bicycle crossing. Disposal will be in accordance with all applicable regulations at locations to be identified at the final design phase. There is no permanent right-of-way impact anticipated for this alternative. Temporary easements of City of Santa Cruz property and two privately owned properties would be required.

Local street improvements, including new five-foot-wide sidewalks, curb, and gutter on the north side of Rooney Street and Morrissey Boulevard between Elk Street and San Juan Avenue, also would be constructed. This work would include four accessible driveway approaches and four pedestrian ramps in compliance with the Americans with Disabilities Act.

1.3.2 No-Build Alternative

The No-Build Alternative would not address the project purpose and need but offers a basis for comparison with the Build Alternative. It assumes no major construction on Highway 1 through the project limits other than planned and programmed improvements and continued routine maintenance. The only planned and programmed improvement contained in the 2005 Regional Transportation Plan is the State Route 1/ State Route 17 Merge Lanes Project, which is currently under construction with completion set for Fall 2008; it is considered as part of existing conditions for the Soquel to Morrissey Auxiliary Lanes Project. The Highway 1 High Occupancy Vehicle Lane Widening Project is also planned, but is not included in the No-Build Alternative, as it is not yet programmed and will not be completed by the 2015 opening year for the Soquel to Morrissey Auxiliary Lanes Project.



Figure 1. Vicinity Map

Source: United States Geological Service



2 REGULATORY SETTING

This section summarizes the regulatory context in which issues associated with water quality are mandated at the federal, state, and local levels.

2.1 Federal Requirements

The primary regulation at the federal level for the quality of surface and ground water is the Clean Water Act. Details are summarized in the sections below.

2.1.1 Clean Water Act

In 1972, the government of the United States passed the Federal Water Pollution Control Act, which later came to be known as the Clean Water Act (CWA). This legislation, issued by the United States Environmental Protection Agency (EPA), established the contemporary legal foundation and structure for regulating water quality throughout the United States. The objective of the CWA is “to restore and maintain the chemical, physical, and biological integrity of the Nation’s waters.” The list below summarizes some of its more important sections:

- Sections 303 and 304 provide water quality standards, criteria, and guidelines for all surface Waters of the United States (US).
- Section 401 requires an applicant for any federal project that proposes an activity that may result in a discharge to Waters of the US to obtain certification from the state that the discharge will comply with other provisions of the CWA. The Waters of the US include all navigable water bodies and all water bodies that drain into a navigable water body.
- Section 402 establishes the National Pollutant Discharge Elimination System (NPDES), a permitting system for the discharge of any pollutant (except for dredge or fill material) into Waters of the US. The State Water Resources Control Board (SWRCB) and the Regional Water Quality Control Boards (RWQCBs) administer this permitting program in the State of California; later sections will discuss the NPDES in detail.
- Section 404 establishes a permit program for the discharge of dredge or fill material into Waters of the US. The United States Army Corps of Engineers (USACE) administers this permit program.

2.1.1.1 National Pollutant Discharge Elimination System (NPDES)

The NPDES permit was established in the CWA to regulate municipal and industrial discharges to surface Waters of the US. The ultimate objective of the CWA is zero pollutant discharge but it recognizes the need for a system to regulate non-zero pollutant discharges until the zero pollutant objective is feasible. Section 402 of the CWA established the NPDES for this purpose. The NPDES regulates all pollutant discharges, particularly point source discharges, to the Waters of the US.

Passage of the Water Quality Act (WQA) of 1987 amended the CWA to specifically include storm water discharges as a type of point source discharge and established the framework for regulating municipal and industrial storm water discharges under the NPDES program. This amendment added storm water related discharges associated with construction projects to the list of discharges that require a NPDES permit. This inclusion of storm water related discharge is why construction projects are subject to the requirements of the NPDES and must satisfy the requirements of all applicable NPDES permits.

Allowable concentrations and mass emissions of pollutants are set only at a regional level. These set concentrations and mass emissions of pollutants are specifically allowed either through site-specific NPDES permits or through other regulatory mechanisms, such as Total Maximum Daily Loads (TMDLs).

Non-point pollution sources are defined as sources originating over a wide area rather than from a definable point. Non-point pollution often enters receiving water bodies in the form of surface water runoff and is not conveyed by way of pipelines or discrete conveyances. As defined in federal regulations, non-point sources are generally exempt from the NPDES permit program requirements. However, non-point source discharges caused by general construction activities are controlled by the NPDES program.

The goal of NPDES non-point source regulations is to improve the quality of storm water discharged to receiving waters to the “Maximum Extent Practicable (MEP)” through the use of Best Management Practices (BMPs). BMPs can include the development and implementation of various practices, including structural measures (e.g., the construction of biofiltration strips or swales, and detention basins), regulatory measures (e.g., local authority over drainage facility design), public policy measures (e.g., labeling of storm drain inlets as to the impacts of dumping on receiving waters), and educational measures (e.g., workshops informing the public of the impacts of household chemicals dumped into storm drains).

2.2 State Requirements

Contemporary water quality regulation began in the State of California with the Dickey Act, which was passed in 1949. The Dickey Act created the RWQCBs and the State Water Quality Control Board, which was later combined with the State Water Resources Board and became known as the SWRCB. In 1962, the State of California passed the Porter-Cologne WQA, which provides the basis for contemporary water quality regulation in the state.

In the State of California, the SWRCB now administers water rights, water pollution control, and federal as well as state water quality functions throughout the state. Each of the RWQCBs is responsible for the protection of beneficial uses of water resources according to federal, state and local regulatory requirements within its jurisdiction and each uses planning, permitting and enforcement authorities to meet these responsibilities. In particular, the SWRCB administers statewide NPDES permits and the RWQCBs

administer local NPDES permits. The Soquel to Morrissey Auxiliary Lanes Project is within the jurisdiction of the Central Coast Regional Water Quality Control Board (CCRWQCB).

2.2.1 Porter-Cologne Water Quality Act

The Porter-Cologne Act significantly expanded the mandate and authority of the SWRCB and RWQCBs to regulate water quality, including the requirement of a “Report of Waste Discharge” for any discharge of waste (liquid, solid, or otherwise) to land or surface waters that may impair a beneficial use of surface or ground water of the state.

The water laws state that the people of the State have the primary interest in the conservation, control, and utilization of the water resources of the State. These water laws also state that the quality of all the waters of the State shall be protected for use and enjoyment by the people of the State. Such laws also regulate activities and factors that may affect the quality of waters of the State in order to attain the highest water quality, that is reasonable, with consideration of all demands made and to be made on those waters and the total values involved, beneficial and detrimental, economic and social, tangible and intangible.

“The Legislature further finds and declares that the health, safety and welfare of the people of the state requires that there be a statewide program for the control of the quality of all the waters of the state; the state must be prepared to exercise its full power and jurisdiction to protect the quality of waters in the state from degradation originating inside or outside the boundaries of the state; the waters of the state are increasingly influenced by inter-basin water development projects and other statewide considerations. The Legislature finds that the factors of precipitation, topography, population, recreation, agriculture, industry, and economic development vary from region to region within the state, and that the statewide program for water quality control can be most effectively administered regionally within a framework of statewide coordination and policy.” (Porter-Cologne Water Quality Act, Chapter 1, Pg. 1, January 2006)

2.2.2 Caltrans National Pollutant Discharge Elimination System Permit

The SWRCB issued the Caltrans Statewide NPDES Storm Water Permit (Order No. 99-06-DWQ, adopted July 15, 1999) to cover all Caltrans projects and facilities in the state. In compliance with this permit, Caltrans developed the Statewide Storm Water Management Plan (SWMP) to address storm water pollution controls related to highway planning, design, construction, and maintenance activities throughout California. The Caltrans Statewide NPDES Storm Water Permit expired in 2004 and the SWRCB approved the revised SWMP (SWRCB Resolution No. 2001-070). However, Caltrans received a memo from the SWRCB on August 4, 2004 that the existing permit continues to be effective until a new permit is issued. Caltrans continues to strictly abide by its NPDES Storm Water permit requirements.

The Caltrans SWMP describes the minimum procedures and practices that Caltrans uses to reduce the pollutants it discharges from storm drainage systems that Caltrans owns or operates. It also outlines procedures and responsibilities for protecting water quality at Caltrans facilities, including the selection and implementation of BMPs. In general, Caltrans is required to reduce pollutants in storm water discharges to the MEP. Pollutants must be reduced using the Best Available Technology Economically Achievable (BATEA), using the Best Conventional Technology (BCT). The Caltrans Statewide NPDES Storm Water Permit requires Caltrans to comply also with the requirements of the Construction General Permit described in Section 2.1.3. The Soquel to Morrissey Auxiliary Lanes Project will be expected to follow the guidelines and procedures outlined in the SWMP.

2.2.3 Construction General NPDES Permit

In accordance with NPDES regulations to minimize the potential effects of construction runoff on receiving water quality, the State requires that any construction activity affecting one acre (0.4 hectares) or more must obtain coverage under the NPDES General Permit for Storm Water Discharges Associated with Construction Activity (General Permit Order No. 99-08-DWQ). Permit applicants are required to prepare a Storm Water Pollution Prevention Plan (SWPPP) and implement BMPs to reduce construction effects on receiving water quality.

The Caltrans Statewide NPDES Storm Water Permit (DWQ No. 99-06-DWQ) references the Construction General permit to regulate storm water discharges from all Caltrans construction projects except for those projects that the RWQCB determines should be covered by an individual permit. Caltrans is required to notify the RWQCB that a project is to be covered under this permit at least 30 days prior to the onset of construction; this is done by filing a Notification of Construction (NOC). The Soquel to Morrissey Auxiliary Lanes Project will obtain permit coverage under the Caltrans Construction General Permit by filing a NOC.

2.2.4 California Coastal Commission

The California Coastal Commission retains permanent coastal permit jurisdiction over development proposed on the immediate shoreline (i.e., tidelands, submerged lands, and public trust lands). The Commission also hears appeals of certain local governments' coastal permit decisions, and must review and approve any amendments to previously certified Local Coastal Programs. Critical Coastal Areas are areas along California's coast where water is identified, according to the Critical Coastal Areas (CCA) Program criteria, as being polluted by storm water runoff and associated non-point source pollutants that can potentially harm the aquatic ecosystem. These Critical Coastal Areas include lakes, lagoons, estuaries, rivers, bays, and the ocean.

According to the *Draft Natural Environment Study* (2008) report prepared for this Project, the proposed Soquel to Morrissey Auxiliary Lanes Project does not affect any areas under the jurisdiction of the Coastal Commission. The San Lorenzo River CCA is the nearest area identified by the California Coastal Commission. However, based on the

USGS Topographic Map, the approximate distance from the west end of the Soquel to Morrissey Auxiliary Lanes Project limits to the San Lorenzo CCA is more than 2.5 miles (4.5 km) downstream, along Arana Gulch, see Figure 3.



Figure 3. Critical Coastal Areas within the proposed Soquel to Morrissey Auxiliary Lanes Project corridor

Source: California Coastal Commission

2.2.5 Areas of Special Biological Significance (ASBS)

Areas of Special Biological Significance (ASBS) are defined in the California Ocean Plan (COP) (SWRCB, August 2006) as marine areas which require protection of species or biological communities to the extent that alteration of natural water quality is undesirable. The COP sets bacterial water quality standards for ocean waters to ensure the protection of water contact recreation and shellfish harvesting. In 1974, the COP designated 34 marine-managed locations in ASBS. Discharges from point sources were prohibited and discharges from non-point sources were to be controlled to the MEP. In 1978, the COP was amended to state that non-point sources of waste discharges were

subject to contaminant concentration thresholds. In 1983, the COP was revised once more to prohibit all waste discharges to ASBS locations.

There are six designated ASBS within the CCRWQB's jurisdiction. Areas of "Sensitive Habitat" are defined in more detail in the Draft Auxiliary Lanes Project Natural Environmental Study Report (Draft Natural Environment Study, 2008). However, no Areas of Special Biological Significance were identified within the Areas of Direct Impact (ADI) (Draft Natural Environment Study, 2008).



Figure 4. Areas of Biological Significance Exclusion Area Map

Source: State Water Resources Control Board

2.2.6 Regional and Local Requirements

The City of Santa Cruz Water Department (SCWD) is a local government agency with water resources management and water supply jurisdictions within the Soquel to Morrissey Auxiliary Lanes Project area. See Figure 5 for their service areas.

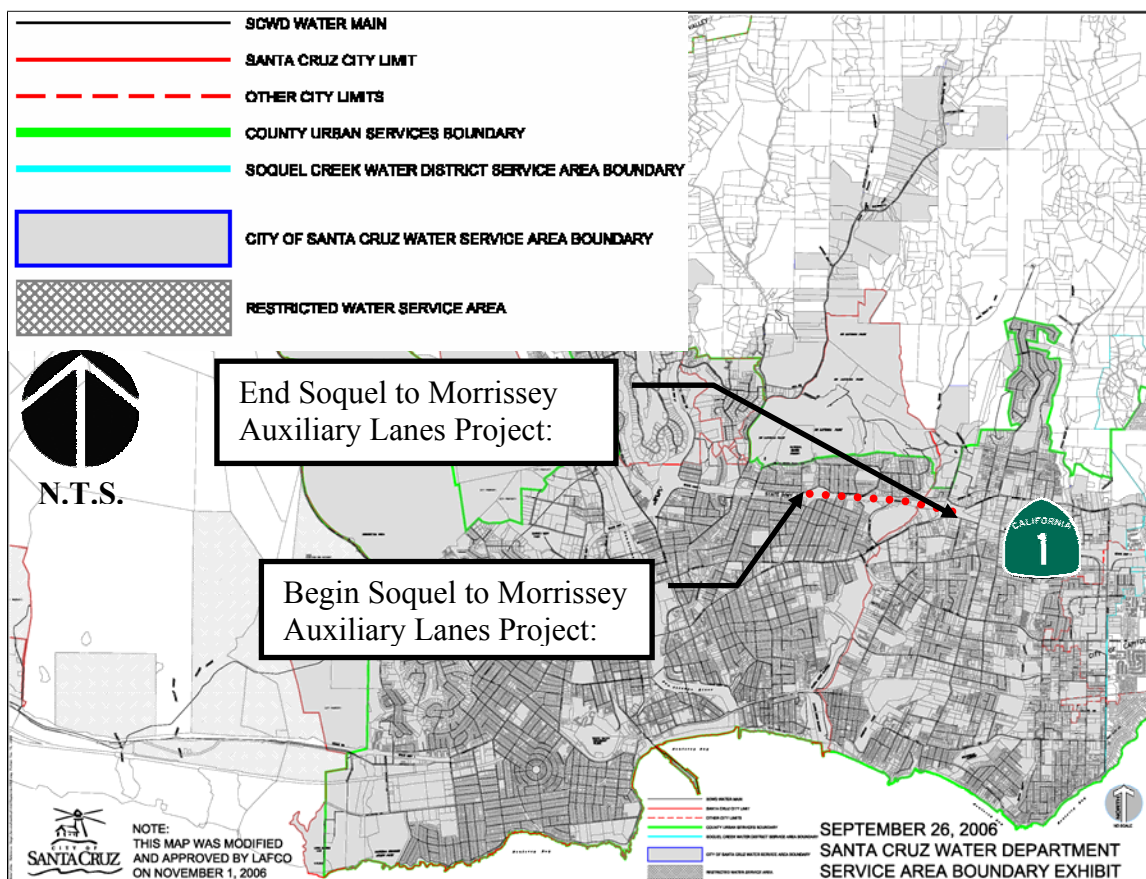


Figure 5. Santa Cruz Water Department Water Service Area Map

Source: Santa Cruz Water Department

The SCWD carries out water quality enforcement by adhering to regulations and standards established by EPA and the State Department of Health Services (DHS). They develop monitoring and testing programs to enforce public health goals for drinking water, which intend to keep contaminants in drinking water at a level below which there is no known or expected risk to health. The SCWD gets its water supply from four local source areas: the North Coast, the San Lorenzo River, Loch Lomond Reservoir and the Live Oak Wells. Three of the four sources of water supply for the SCWD are from surface waters that depend on rainfall and runoff, and the fourth is from ground water near Pleasant Point pumped out of the Live Oak Wells.

The Soquel to Morrissey Auxiliary Lanes Project is also within two MS4 areas, the City of Santa Cruz, and the County of Santa Cruz. Figure 6, is a figure from the County's SWMP and shows the general MS4 County limits (which excludes the City). However,

the majority of the Soquel to Morrissey Auxiliary Lanes Project limits are in the City of Santa Cruz MS4 boundary. The City has developed a comprehensive SWMP and is in the process of obtaining compliance and permit coverage under the Phase II NPDES General Permit for Discharges of Storm Water from Small Municipal Separate Storm Sewer Systems (MS4 Permit). The MS4 Phase II NPDES General Permit objective is to reduce the amount of pollutants discharged in urban runoff. The City's Storm Water Management Program is a comprehensive program focused on reducing the discharge of pollutants to the storm drain system, which flows into local creeks and Monterey Bay.

There is also a Storm Water Ordinance (SWO) that was adopted by the City of Santa Cruz on April 28, 1998, that became effective on May 28, 1998. This ordinance, "Storm Water and Urban Runoff Pollution Control," corresponds to Chapter 16.19 of the City's Municipal Code. This SWO prohibits non-storm water discharges to the storm drain system except those authorized by a NPDES permit.

The County of Santa Cruz and the City of Capitola (not within the Project limits) have submitted to the RWQCB, a joint revised SWMP in order for the RWQCB to determine compliance with the General Permit and recommend coverage under the small MS4 General Permit. The county of Santa Cruz and the City of Capitola (not within the Project limits) have the SWMP for Fiscal Years 2003-2004 through 2007-2008 published on the website. Figure 6, illustrates the MS4 boundary for Santa Cruz County.

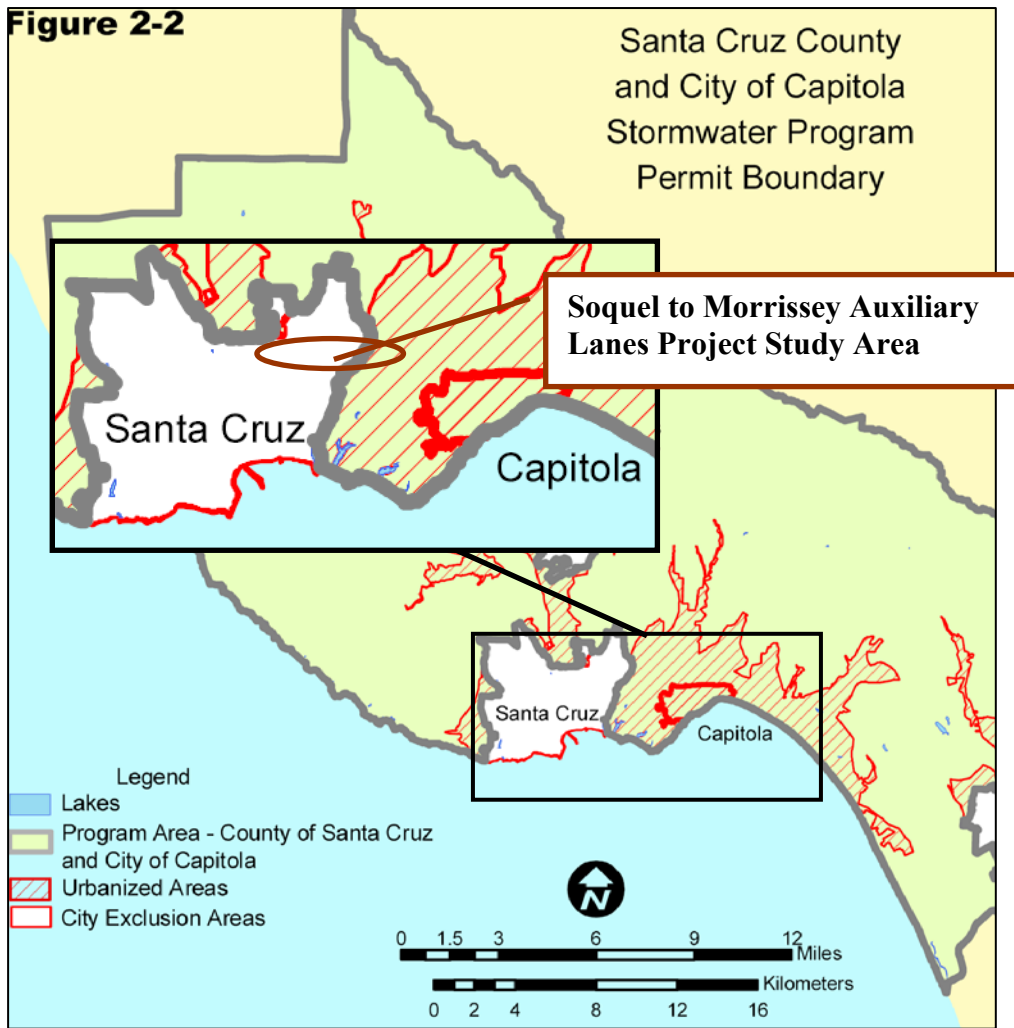


Figure 6. MS4 areas for the Santa Cruz County

Source: Santa Cruz County

3 AFFECTED ENVIRONMENT AND EXISTING CONDITIONS

3.1 Study Area

For water quality study purposes, the study area that was assessed is limited to the watersheds upstream and within the Soquel to Morrissey Auxiliary Lanes Project limits and the downstream direct receiving water bodies. The proposed improvements for the Soquel to Morrissey Auxiliary Lanes Project is limited to Caltrans' right-of-way. These limits are along Highway 1 and bounded on the south by the Soquel Avenue/Soquel Drive Interchange and on the north by the Morrissey Boulevard interchange.

3.2 Study Methods and Procedures

The methods and procedures considered for the development of this report are the adherence and guidance of the federal, state, and local water quality laws and regulations relevant to the Soquel to Morrissey Auxiliary Lanes Project study area. These laws and regulations are the CWA, California's Porter-Cologne Water Quality Control Act, and Santa Cruz City and County regulations.

Water quality related permits at the statewide level for the Soquel to Morrissey Auxiliary Lanes Project were also studied and addressed in this report, e.g., the Caltrans NPDES Statewide Permit and Construction General Permit for construction and dewatering. The water quality regulations of the RWQCB were also addressed, such as those pertaining to water resources designated as beneficial uses and those pertaining to water quality objectives. The CCRWQCB established a General Basin Plan with goals and policies that apply to the county's water resources regarding beneficial uses and water quality objectives.

As part of this Water Quality Study, existing topography data from the United States Geological Survey, erosion and climate data from the United States Department of Agriculture's (USDA) Soil Survey Study, and hydrologic and surface streams information from the Federal Emergency Management Agency (FEMA) composed Flood Insurance Study (FIS) Report were reviewed. Information regarding existing ground water, and biotic and aquatic groups specific to the study area was considered in order to evaluate the impacts that would result from the construction, operation and maintenance of the Soquel to Morrissey Auxiliary Lanes Project.

3.3 General Water Resources Setting

The southern and northern Soquel to Morrissey Auxiliary Lanes Project limits are, respectively, the Soquel Avenue/Soquel Drive Interchange and the Morrissey Boulevard Interchange. The Soquel to Morrissey Auxiliary Lanes Project corridor crosses the Arana Gulch and three tributaries of Arana Gulch. These creeks pass under the freeway by means of existing culverts. These creeks include some riparian habitat (*Highway 1 Soquel to Morrissey Wetlands Assessment*, (2008)). USACOE wetlands and other waters are also within the Project's Biological Study Area.

3.3.1 Topography

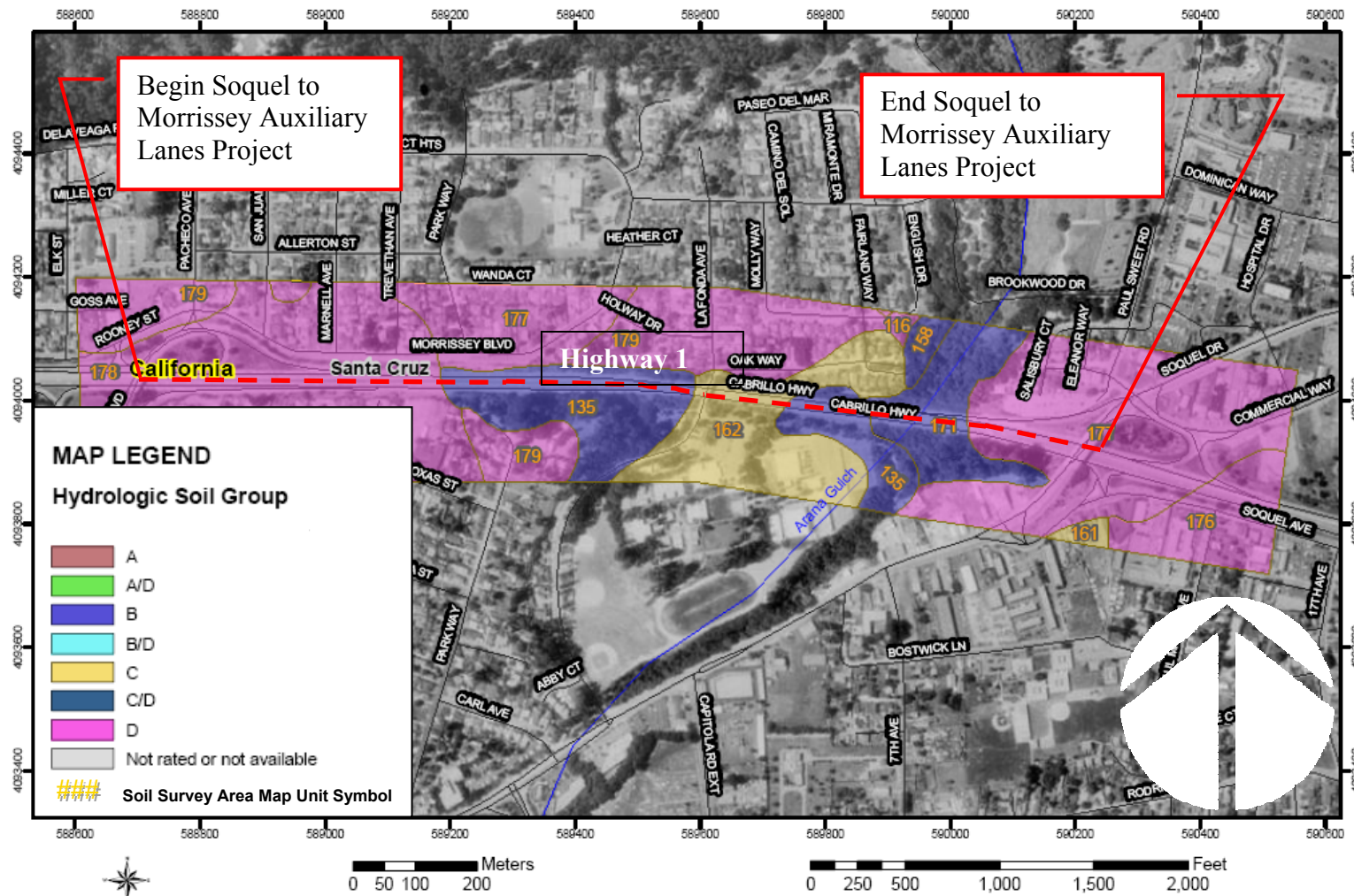
The Project area between Morrissey Boulevard and Soquel Avenue ranges in elevation from 98.4 ft to 59.1 ft (31 m to 18 m) (USGS, 1994). This segment of the Project is near coastal terraces, with some parts of the Project limits in Scotts Valley and the lower slopes of the Santa Cruz Mountains (FEMA, 1986).

3.3.2 Soils and Geology

A Preliminary Geotechnical Report (2008) was prepared as part of the project. The Preliminary Geotechnical Report indicates that the subsoil conditions generally consist of loose to very dense silty sand to coarse sand. Furthermore, the subsoils mainly consist of

Marine Terrace deposits (Qt; Pleistocene), Alluvium (Qpa; Pleistocene) and Sedimentary rock (Tmps, Pliocene).

Additional information on Hydrologic Soil Groups (HSG) was found in the Web Soil Survey from the Natural Resources Conservation Service (NRCS).. HSGs are divided into four groups, identified as Group A, Group B, Group C, or Group D, that correspond to the rate of water infiltration when soils are not protected by vegetation, are saturated, and receive precipitation from long-duration storms. Group A soils have a high infiltration rate (low runoff potential) when saturated. These soils are made up of mainly deep, well drained to excessively drained sands or gravelly sands and have a high rate of water transmission. Group B soils have a moderate infiltration rate when saturated. Group C soils have a slow infiltration rate when thoroughly wet and consist primarily of soils having a layer that impedes the downward movement of water or soils of moderately or fine texture. These soils have a slow rate of water transmission. Group D soils have a very slow infiltration rate and therefore a high runoff potential when saturated. These soils primarily are clays that have a high shrink-swell potential, soils that have a high water table, soils that have a clay layer at or clay layer or near the surface, and soils that are shallow over nearly impervious material. Group D soils have a very slow rate of water transmission. Soils within the Project limits are listed in Table 1. The three HSGs found within the project limits are predominantly Group D soils, with some Group B, and Group C. This indicates that the project has medium to low infiltration rates when saturated, and receive precipitation from long duration storms, with a majority of the area having high runoff potential; see Figure 7.



Source: NRCS Web Soil Survey

¹ Note: The numbers in each Hydologic Soil Group corresponds to soil group names that are listed in table entitled Soil Survey Areas within the Soquel to Morrissey Auxiliary Lanes Project Study Area.

Table 1. Soil Survey Areas within the Soquel to Morrissey Auxiliary Lanes Project Study Area

Soil Survey Area Map Unit Symbol	Map Unit Name	HSG
116	Bonnydoon loam, 5 to 30 % slopes	D
135	Elkhorn sandy loam, 15 to 30 % slopes	B
158	Nisene-Aptos complex, 50 to 75 % slopes	B
161	Pinto loam, 0 to 2 % slopes	C
162	Pinto loam, 2 to 9 % slopes	C
171	Soquel loam, 2 to 9 % slopes	B
177	Watsonville loam, 0 to 2% slopes	D
178	Watsonville loam, thick surface, 0 to 2 percent slopes	D
179	Watsonville loam, thick surface, 2 to 15 % slopes	D

Source: NRCS Web Soil Survey

3.3.3 Erosion Potential

The NRCS also provides general soil erodibility information within the Project limits. Soil erodibility factor (K) is a measure of the susceptibility of a given soil type to erosion by water, and varies from 0.10 to 0.60, with soils having the highest K values as most erodible. To estimate annual soil loss per acre, the K value of a soil is modified by factors representing plant cover, grade and length of slope, soil management practices, and climate. The K factors for the soils within the Soquel to Morrissey Auxiliary Lanes Project area are 0.17 at the Morrissey Boulevard, and Highway 1 Interchange, and 0.37 on the Soquel Avenue and Highway 1 Interchange. This indicates that the Soquel to Morrissey Auxiliary Lanes Project has low to medium susceptibility to water erosion in these areas.

“Soil-loss tolerance factor” (T) is the maximum rate of erosion for a given soil, whether from rainfall or soil blowing, that can occur without reducing crop production or environmental quality. The rate is expressed in tons of soil loss per acre per year. The Tolerance factor for the soils in the Soquel to Morrissey Auxiliary Lanes Project area range from 3 to 5, meaning that the soils are deep, and, therefore, not subject to erosion.

3.3.4 Climate and Precipitation

The mean annual precipitation at the project site, based on data from the Oregon Climate Service for the years between 1895 and 2006, is 30 inches (750 mm) (2007). The major drainage basin is the San Lorenzo watershed and the sub basin is the Arana Gulch watershed. According to the Caltrans Storm Water Quality Handbooks, the project is

within Rain Area 5, which is within the Northern California Rain Area. Its designated rainy season is from October 15th through April 15th.

Generally, flood-producing rainfall can occur during the winter months, between December and March. Westerly exposure to Pacific weather systems promotes intense precipitation from storms. Mountains and hills bordering the eastern boundaries of Santa Cruz County squeeze moisture out of arriving Pacific weather systems and provide watershed areas to funnel precipitation into runoff tributaries. Flood stage can swell to flood peaks in a few hours with high velocities in the main channel.

3.3.5 Regional Hydrology

The major drainage basin within the Project area is the San Lorenzo basin and Arana Gulch is the subbasin. Figure 8 depicts the location of the Project relative to the San Lorenzo River watershed and the Arana Gulch sub basin.



Figure 8. Regional Hydrology for the Soquel to Morrissey Auxiliary Lanes Project

Source: Santa Cruz County

3.3.6 Local Hydrology

Drainage basins in Santa Cruz County are short and steep with short flow durations. Mountains and hills bordering the eastern boundaries of Santa Cruz County squeeze moisture out of arriving Pacific weather systems and provide watershed areas to funnel precipitation into runoff tributaries. Figure 9 shows the local hydrology.

The following descriptions of creek crossings and channels are provided by the *Highway 1 Soquel to Morrissey Wetlands Assessment*, (2008).

"The portion of Arana Gulch assessed consists of a broad, slightly incised channel in an urban setting dominated by California Bay, Eucalyptus, Redwood, Coast Live Oak, California Blackberry, Poison Oak, Stinging Nettle, Box Elder, and Arroyo Willow. Natural channel areas exhibit a clay or sand bottom averaging 10 to 20 feet (3 to 6.1 meters) wide at the OHWM, which is approximately 2.5 feet (0.7 meters) above the thalweg. This creek receives runoff from a large urban watershed area, including several tributary channels. Tributary channels to Arana Gulch are fed by residential runoff and highway drop inlets from the south of the Project area.

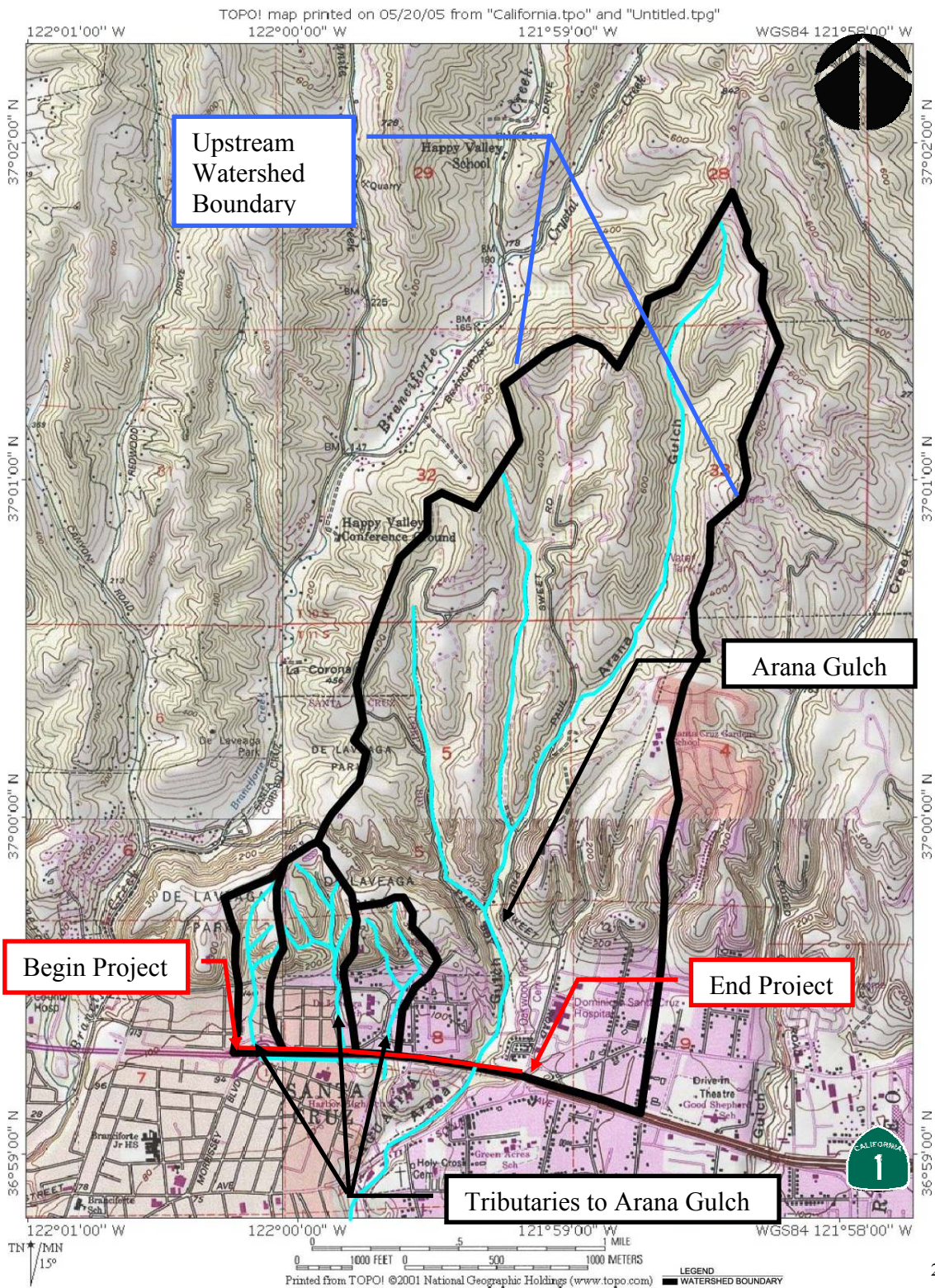


Figure 9. Watershed Map (Local Hydrology for Arana Gulch)

Source: United States Geological Survey

² Note: Figure 4. Watershed Map shows only tributary delineation for flow upstream of the Project.

3.3.7 Population and Land Use

The land use in the vicinity is developed with some open lots and surrounding vegetation. The surrounding areas are mostly residential and commercial.

The estimated population for Santa Cruz County in 2006 was 254,538. There are four incorporated cities within Santa Cruz County. The project is between two of these cities, the City of Santa Cruz, with a population of 54,593, and Capitola, with a population of 10,033.

Santa Cruz County has a land area of 445 square miles (1152.54 square kilometers). Land use consists mostly of residential and vacant land, with minor commercial and industrial developments.

3.4 Existing Surface Water Resources Environment

Surface water resources near and along the Soquel to Morrissey Auxiliary Lanes Project limits include the Arana Gulch, three tributaries of Arana Gulch, the Monterey Bay, and the Pacific Ocean.

3.4.1 Surface Streams

Four waterways cross Highway 1 along the Soquel to Morrissey Auxiliary Lanes Project reach: Arana Gulch and three tributaries. These are the highway's direct receiving water bodies.

Four creek crossings were located from reviewing as-built record drawings, USGS Topographic Maps, and the *Highway 1 Soquel to Morrissey Wetlands Assessment*, (2008). More detail information on the drainage facilities at the major crossings of Highway 1 was included in the Drainage Impact Study Report (2008). The existing culverts at the crossings of the creeks at Highway 1 are shown in Table 2.

Table 2. Culverts at Major Crossings of Highway 1

Waterway	Station	Culverts Size	
		Metric	English
Arana Gulch	171+03	1800 mm concrete arch culvert	72" height concrete arch culvert
Tributary to Arana Gulch	175+98	1200 mm Concrete culvert	48" Concrete culvert
Tributary to Arana Gulch	177+92	1200 mm x 1200 mm RCB culvert	4' x 4' Reinforced concrete box culvert
Tributary to Arana Gulch	183+01	750 mm RCP culvert	30" Reinforced concrete pipe culvert

3.4.2 Beneficial Uses of Receiving Water Bodies

Beneficial uses are critical to water quality management in California. According to state law, the beneficial uses of California's waters that may be protected against quality degradation include (but are not limited to) "...domestic; municipal; agricultural and

industrial supply; power generation; recreation; aesthetic enjoyment; navigation; and preservation and enhancement of fish, wildlife, and other aquatic resources or preserves” (Water Code Section 13050). Beneficial uses for surface and ground waters are divided into the twenty standard categories with definitions listed in Appendix B. Protection and enhancement of existing and potential beneficial uses are the primary goals of water quality planning.

Beneficial Uses for Arana Gulch are listed in the *Central Coast Regional Water Quality Control Board Basin Plan* as follows:

- Municipal and Domestic Supply (MUN)
- Ground Water Recharge (GWR)
- Water Contact Recreation (REC-1)
- Non-Contact Water Recreation (REC-2)
- Wildlife Habitat (WILD)
- Cold Freshwater Habitat (COLD)
- Migration of Aquatic Organisms (MIGR)
- Fish Spawning (SPWN)
- Rare, Threatened, or Endangered Species (RARE)
- Freshwater Replenishment (FRESH)
- Commercial and Sport Fishing (COMM)

3.4.3 Water Quality Objectives

The 1972 Amendments to the federal Water Pollution Control Act declared that elimination of discharge of pollutants into navigable waters is a national goal (SWRCB). The establishment of a base, or reference, point is a prerequisite to water quality control. The RWQCB needs to utilize current technical guidelines, available historical data, and enforcement feasibility when formulating water quality objectives.

The general water quality objectives established for all inland surface waters, enclosed bays, and estuaries within the Central Coast Region’s Hydrologic Basin are color, tastes and odor, floating material, suspended material, settleable material, oil and grease, biostimulatory substances, sediment, turbidity, pH, dissolved oxygen, temperature, toxicity, pesticides, chemical constituents, organic substances, and radioactive substances. The receiving water bodies for this project are not listed as having specific water quality objectives. See Appendix A for more information regarding the general objectives for all inland surface waters, enclosed bays, and estuaries.

Per CCRWQCB Basin Plan, the general water quality objectives for all ground waters in the Central Coast area include tastes, odors and radioactivity. Ground waters shall not contain taste or odor producing substances in concentrations that adversely affect beneficial uses. In addition, radionuclides shall not be present in concentrations deleterious to human, plant, animal or aquatic life. Appendix A summarizes water quality objective based on beneficial uses established by the CCRWQCB.

3.4.4 Possible Pollutants Affecting Water Quality

Total Maximum Daily Load (TMDL) requirements limit the amount of a given pollutant that a water body can receive, from both point and non-point sources, without violating water quality standards and designated uses. Under the Clean Water Act Section 303(d), TMDLs must be developed for all water bodies that do not meet water quality standards after application of technology-based controls.

The CWA Section 303(d) List of Water Quality Limited Segments (hereto known as “303(d) List”) is a list that the SWRCB develops for water quality limited segments. These listed waters do not meet water quality standards. The 303(d) List is revised typically every two years. The 2006 CWA Section 303(d) List was partly approved by USEPA on June 28, 2007.

None of the waterways within the project limits are listed on the 2006 303(d) List.

3.4.5 Flooding Sources

The FEMA Flood Insurance Rate Maps (FIRMs) for the study area indicate that a floodplain is associated with the Arana Gulch crossing with Highway 1. Detailed information on floodplains and its impacts for the Soquel to Morrissey Auxiliary Lanes Project is in the *Location Hydraulic Study Report* (2008).

Early denizens of Santa Cruz County built homes in higher ground, avoiding the floodplains at the lower lying ground areas. Over time, these floodplain areas were developed. High intensity precipitations will likely cause flooding in these lower-lying ground areas. The drainage basins in Santa Cruz County are short and steep with short flow durations. Flood stage can swell to flood peaks in a few hours with high velocities in the main channel.

Flooding along the Pacific Coast of Santa Cruz County is typically associated with the simultaneous occurrence of very high tides, large waves, and storm swells during the winter. Flood hazards along the coast are generated by swell waves from offshore storms, by wind waves from land-falling storms, and by tsunamis. Other hazards, that present potential damage to structures, exposure to erosion, and impacts to channels, are landslides, earthquakes, and wildland fires. Areas in Santa Cruz County would be significantly impacted by a tsunami created by an earthquake on the San Gregorio fault; the fault is located offshore in Monterey Bay and roughly parallels the coastline. The tsunami created by such an earthquake would arrive without warning, minutes after the initial shock (FEMA, 2006).

These flooding sources have had significant impacts on ocean-front development. Direct wave impacts sustained by beachfront homes during the severe storms of January 1978 accelerated erosion and weakened foundations. Seawalls and temporary barriers, intended to protect the beach shoreline, were either damaged or destroyed. In addition, storm centers from the southwest produce storm flow patterns toward the coast that have

caused the majority of the serious coastal floods; strong winds and high tides create storm surges that back up river flows and this leads to flooding at the river mouths (FEMA, 2006).

3.4.6 Geomorphology

Geomorphology of surface water resources such as stream channels or lakes is a component of the composition of the soil that formed the channel banks and the pattern and intensity of water flow in the channels or over the surrounding ground surfaces. Fluvial geomorphology is the study of rivers and streams and the processes that form them more specifically effects on the existing waterways. Overall, rivers and streams not only are conduits of water (roadway runoff) but they also transport sediment.

Several studies have been made by the Arana Gulch watershed, according to the *Arana Gulch Watershed Enhancement Plan Phase 1: Steelhead and Sediment Assessments, Santa Cruz County, California (February 2002)*. According to this study, there have been issues with erosion in the Arana Gulch watershed. The *Arana Gulch Watershed Enhancement Plan*, states that there are three reasons for erosion processes, in summary the reason for this is stream sediment deposits on channel banks and bed and channel reaches are incising rather than aggrading and widening. In the *Arana Gulch Watershed Enhancement Plan*, poorly sized culverts under road crossings are causing large woody debris after intense storms to worsen local channel incision in Arana Gulch. It has been proposed for this Project to replace one major undersized existing cross culverts within the right-of-way (Tributary to Arana Gulch Station 177+92) and accommodate the drainage systems with improvements for the design phase.

The *Highway 1 Soquel to Morrissey Wetlands Assessment*, (2008) Report describes a portion of Arana Gulch as a broad, slightly incised channel. The report provides a detailed description of the existing vegetation in this channel, designated as Jurisdictional Site # 2, and describes the areas around the channel as clayey or sand, with bottom width ranging from 10 to 20 feet wide, at the OHWM. The creek receives runoff from a large urban area.

The Project's design goal is to maintain pre-construction storm water discharge flows by metering or detaining flows to pre-construction rates prior to discharge to a receiving water body or an MS4 system, and therefore it is anticipated there would be minimal effects to the hydrograph of the Project will not be changed.

Roadway and drainage improvements proposed for the project and its downstream effects can be evaluated using computer modeling by evaluating a watershed for cumulative effects from impervious surface. This computer modeling is not possible for this phase of the Project; however, as survey information becomes available, this specific task will be performed to address this issue.

3.4.7 Existing Surface Water Quality and Sensitivity

Surface water quality information in the Soquel to Morrissey Auxiliary Lanes Project area was obtained from the State Water Resources Control Board's Surface Water Ambient Monitoring Program (SWAMP). The primary factors contributing to water quality issues in this region are related to non-point source pollution associated with row crop agriculture, vineyards, rangeland, and timber harvest. Furthermore, urban runoff problems are increasing in some parts of the region.

3.5 Existing Ground Water Resources Environment

The following sections present information about existing ground water within the Soquel to Morrissey Auxiliary Lanes Project limits. The Central Coast Hydrologic Region has 50 delineated groundwater basins and the Soquel to Morrissey Auxiliary Lanes Project falls within the Soquel Valley and the San Benito River Valley groundwater basins.

3.5.1 Study Area and Recharge Areas

The Soquel to Morrissey Auxiliary Lanes Project is within the Central Coast Hydrologic Region (HR). This HR has 50 delineated ground water basins. The Soquel to Morrissey Auxiliary Lanes Project is within the Soquel Valley (3-1) and the San Benito River (3-28) ground water basins. Soquel Valley Basin covers an area of 2,500 acres (1,012 ha) and the San Benito River covers an area of 24,200 acres (9,793 ha). Ground water is an extremely important water supply source; within this region, ground water accounted for 83 percent of the annual supply used for agriculture and urban purposes in 1995 (DWR, 2003).

According to the Preliminary Geotechnical Report (2008), information on as-built Log of Test Boring (LOTB) data, shallow groundwater was encountered at the Morrissey Overcrossing, an elevation of 95 feet. No data was available at the Soquel Avenue OC, according to the Preliminary Geotechnical Report (2008).

3.5.2 Local Area Springs and Wells

Figure 11 is a map obtained from the Department of Water Resources' Ground Water Level Monitoring program database, which indicates the approximate locations and positions of ground water wells within the Soquel to Morrissey Auxiliary Lanes Project limits. The list of waterways that are potential recharge sources for the ground water aquifers that cross the Soquel to Morrissey Auxiliary Lanes Project limits is included in Table 2 of this report.

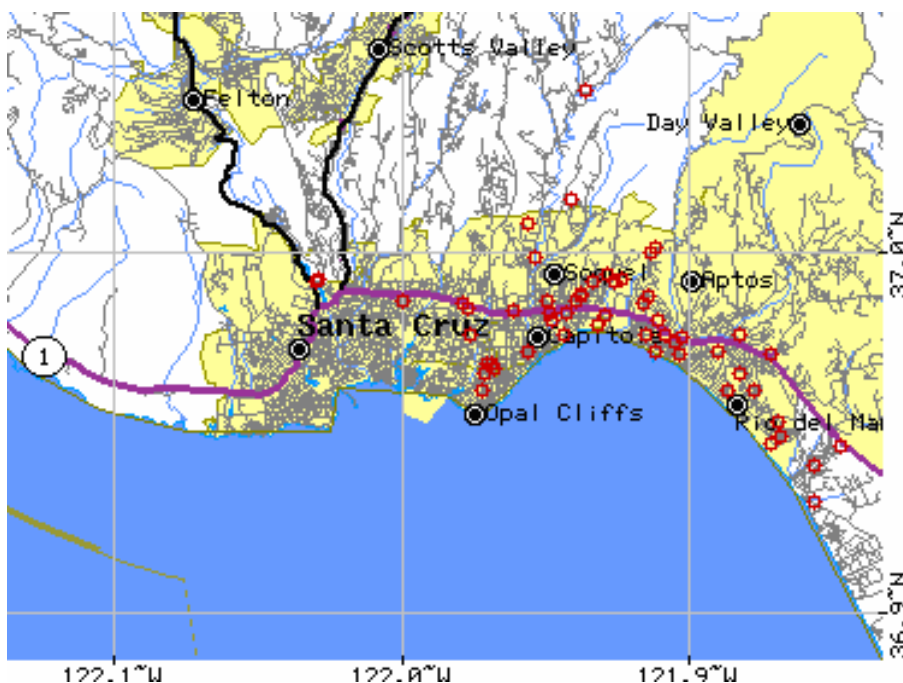


Figure 10. Ground Water Wells in the Soquel to Morrissey Auxiliary Lanes Project Area
 Source: Department of Water Resources, 2003

3.5.3 Objectives for Ground Water Quality and Local Ground Water Constituents

According to the Basin Plan established by the CCRWQCB, objectives for ground water quality include monitoring and controlling tastes, odor, and radioactivity. Specific objectives were established for ground water for use in municipal, domestic and agricultural supply. Table 3 lists contaminant groups and frequently occurring contaminants, some of which have wells in the Central Coastal Hydrologic Region that exceeded the Maximum Contaminant Level (California's Groundwater Update 2003).

Table 3. Most Frequently Occurring Contaminant Groups in the Central Coast Hydrologic Region

Contaminant Group	Contaminant	# of wells	Contaminant	# of wells	Contaminant	# of wells
Inorganics – Primary	Antimony	6	Aluminum	4	Chromium (Total)	4
Inorganics – Secondary	Iron	145	Manganese	135	TDS	11
Radiological	Gross Alpha	15	Radium 226	3	Uranium	3
Nitrates	Nitrate (as NO ₃)	69	Nitrate + Nitrite	24		
Pesticides	Heptachlor	4	Di (2-Ethylhexyl) phthalate	2		
VOCs/SVOCs	TCE	3	3 are tied at 2 exceedances			

Source: Department of Water Resources, 2003

TCE= Trichloroethylene
 VOC=Volatile Organic Compound
 SVOC=Semi-volatile Organic Compound

3.6 Other Existing Water Quality Considerations

Areas adjacent to existing creek crossings and along the Biological Study Area (BSA) are under the jurisdiction of the California Department of Fish and Game, the CCRWQCB, and the USACOE. These crossings make up the surface water resources environment within the Soquel to Morrissey Auxiliary Lanes Project limits that serve different functions. Table 4 lists and quantifies areas within Jurisdictional Waters and Wetlands within the BSA.

Consultation with U.S. Fish and Wildlife Service (USFWS) pursuant to Section 7 of the Endangered Species Act may be necessary for potential impacts to federally listed species; marsh sandwort, Monterey spineflower, Santa Cruz tarplant, California Red Legged Frog, yellow-billed cuckoo (federal candidate for listing), and least Bell's vireo (LBV) (*Draft Natural Environment Study*, 2008).

On the other hand, consultation with USFWS for tidewater goby, and with the National Marine Fisheries Service (NMFS) for the central California coast steelhead evolutionary significant unit (ESU), is not anticipated. Although the survey that was performed for this project indicated that Arana Gulch contains the primary constituent elements (PCEs) for steelhead critical habitat, the Arana Gulch tributaries are of inferior habitat quality and do not support the suitable PCEs, within the BSA. The project design has been updated to avoid impacts to Arana Gulch, and will only affect ephemeral tributaries that do not support steelhead habitat. Therefore, the Soquel to Morrissey Auxiliary Lanes Project avoids impacts to fish species

Table 4. Jurisdictional Waters and Wetlands within the Biological Study Area

Jurisdictional Area	Total Areas		
	Area in Sq. Feet	Area in Sq. Meters	Area in Acres
ACOE Wetlands	59,288	5,508	1.36
ACOE Other Waters	23,519	2,185	0.54
CDFG jurisdiction	382,958	35,578	8.79

Source: Highway 1 Soquel to Morrissey Auxiliary Lanes Project Wetland Assessment, 2008

The estimates for Area of Direct Impact include the following.

Table 5. Potential Impacts to Jurisdictional Areas within Area of Direct Impact

Jurisdictional Area	Permanent Impacts			Temporary Impacts		
	Area in Sq. Feet	Area in Sq. Meters	Area in Acres	Area in Sq. Feet	Area in Sq. Meters	Area in Acres
ACOE Wetlands	0	0	0	0	0	0
ACOE Other Waters	181	17	0.004	121	11	0.003
CDFG jurisdiction	14,779	1,373	0.339	2,809	261	0.064

Source: Highway 1 Soquel to Morrissey Auxiliary Lanes Project Wetland Assessment, 2008

4 ENVIRONMENTAL CONSEQUENCES AND PROJECT IMPACTS

The following sections present potential temporary and permanent water quality impacts anticipated from the proposed Soquel to Morrissey Auxiliary Lanes Project activities. The discussions include Caltrans procedures for identifying potential impacts.

4.1 Temporary Impacts to Storm Water

During construction, the Soquel to Morrissey Auxiliary Lanes Project has potential to cause temporary water quality impacts due to grading activities and removal of existing vegetation, which can cause increased erosion. Storm water runoff from the Soquel to Morrissey Auxiliary Lanes Project may transport pollutants to nearby creeks and storm drains if BMPs are not properly implemented. Storm water runoff drains into Arana Gulch and its tributaries. Generally, as the Disturbed Soil Areas (DSA) increase, the potential for temporary water quality impacts also increases. The Build Alternative has an estimated disturbed soil area (DSA) of 5 ac (1.71 ha).

Fueling or maintenance of construction vehicles will also occur within the Soquel to Morrissey Auxiliary Lanes Project site during construction, so there is risk of accidental spills or releases of fuels, oils, or other potentially toxic materials. An accidental release of these materials may pose a threat to water quality if contaminants enter storm drains, open channels, or surface water receiving bodies. The magnitude of the impact from an accidental release depends on the amount and type of material spilled.

4.2 Temporary Impacts to Ground Water

The proposed improvements for the Soquel to Morrissey Auxiliary Lanes Project do not involve substantial excavations that would affect ground water resources, but the Soquel to Morrissey Auxiliary Lanes Project may require ground water control measures during construction. Groundwater was encountered at a shallow depth, an elevation of 95 feet, at the Morrissey Overcrossing. No data was available at the Soquel Avenue OC, according to the Preliminary Geotechnical Report (2008). Excavation work will mostly consist of roadbed construction for the new auxiliary lanes. However, deeper excavations are proposed for the work associated with the replacement of the foundations for the La Fonda Avenue Overcrossing, retaining walls, and sound walls. Dewatering may be required for these excavations or at other locations with high ground water.

4.3 Temporary Impacts to Water Resources

During construction, the Soquel to Morrissey Auxiliary Lanes Project has the potential to cause temporary water quality impacts to adjacent USACOE or Fish and Game jurisdictional areas. These temporary impacts can result from dewatering activities, vegetation removal, temporary fill due to construction activities for road construction or for culvert removal or replacement. These areas are summarized in Table 5 and delineated in the Highway 1 Soquel to Morrissey Auxiliary Lanes Project Wetland Assessment, (2008).

4.4 Permanent Impacts to Water Resources

The Federal Highway Administration (FHWA) has performed various studies and has found that street and highway storm water runoff has potential to affect water quality. The nature of these impacts depends on the uses and flow rate or volume of the receiving water body, rainfall characteristics, and street or highway characteristics. Heavy metals associated with vehicle tire and brake wear, oil and grease, and exhaust emissions are the primary pollutants associated with transportation corridors. Generally, highway storm water runoff has the following pollutants: Total Suspended Solids (TSS), nitrate nitrogen, Total Kjeldahl Nitrogen (TKN), phosphorous, Ortho-phosphate, Copper, Lead and Zinc (Caltrans, November 2003). Some sources of these pollutants are natural erosion, phosphorus from tree leaves, combustion products from fossil fuels, and the wearing of break pads. The No-Build Alternative may have potential permanent water quality impacts due to continuing congestion, leading to a greater deposition of particulates from exhaust and heavy metals from braking. There are no existing treatment BMPs along Highway 1 within the Soquel to Morrissey Auxiliary Lanes Project limits to treat roadway runoff; therefore, the water quality of the receiving water bodies would still be affected by highway runoff as a result of the No-Build Alternative.

Highway widening projects increase impervious areas therefore, has the potential to increase the volume and velocity of storm water flow to downstream receiving water bodies. In addition, pollutant loading can also increase. The added impervious area is directly related to the amount of potential permanent water quality impacts. Since there will be an increase in impervious area for the Soquel to Morrissey Auxiliary Lanes Project, an increase in storm water impacts is expected if BMPs are not implemented. The added impervious area for the Soquel to Morrissey Auxiliary Lanes Project was estimated to be 1.75 acres (0.72 hectares), which may reduce the infiltration of rainfall and increase roadway runoff.

In comparison with the overall watershed of the creeks, the increase in flow due to the proposed widening of the highway is minimal for the Build Alternative as shown in Table 6. The overall percent increase of added impervious area is 0.6 percent for the whole Project. Due to the existing sensitive issues for arena gulch and its tributaries measures to reduce erosion potential downstream should be further evaluated during the design phase of the Project.

Table 6. Increase in Impervious Area by Watershed

	Station at Highway 1 Crossing	Increased Impervious Area (acres)	Watershed Areas (acres)	Percentage Increase in Area
Arana Gulch	171+03	1.3	2,239	0.06%
Tributary to Arana Gulch	175+98	0.24	71	0.34%
Tributary to Arana Gulch	177+92	0.21	108	0.20%
Tributary to Arana Gulch	183+01	0	53	0%

5 AVOIDANCE, MINIMIZATION, AND MITIGATION MEASURES

Two alternatives, the No-Build Alternative and Build Alternative have been evaluated, and avoidance or minimization measures have been considered to avoid environmental impacts while maintaining the Soquel to Morrissey Auxiliary Lanes Project's need and purpose. This Soquel to Morrissey Auxiliary Lanes Project will have minimal impacts to water quality with the following avoidance, minimization, and proposed mitigation measures incorporated.

5.1 Avoidance and Minimization Measures for Water Resources

Avoidance Measures for the Soquel to Morrissey Auxiliary Lanes Project were evaluated through preliminary consultation with local agencies. Existing USACOE wetlands and other Waters within the Soquel to Morrissey Auxiliary Lanes Project limits were identified (Highway 1 Soquel to Morrissey Auxiliary Lanes Project Wetland Assessment, 2008). Direct impacts to wetlands were minimized through use of retaining walls. In addition, during the Plans Specifications and Estimate (PS&E) Phase of the project, protection of Environmentally Sensitive Areas (ESAs) within the BSA will be maximized and will be specified in the contract documents. All proposed construction work in jurisdictional areas will also be scheduled per regulatory construction windows in order to minimize impacts

5.2 Caltrans Standard Procedures and Practices for Addressing Storm Water Impacts

The Caltrans's NPDES permit, the SWRCB, and other regulatory agencies require water quality measures for the anticipated water quality impacts detailed in Section 4 of this report. Implementation of these water quality measures will be developed and incorporated into the Soquel to Morrissey Auxiliary Lanes Project design and construction operations. Short-term construction-related water quality impacts and permanent water quality impacts will be avoided or minimized with the implementation of such water quality measures. Construction Site BMPs are implemented during construction activities to reduce pollutants in storm water discharges throughout construction. Design Pollution Prevention BMPs are permanent measures to improve storm water quality by reducing erosion, stabilizing disturbed soil areas, and maximizing vegetated surfaces. Treatment BMPs are permanent devices and facilities that treat storm water runoff.

5.2.1 Project Construction

Temporary impacts from the Soquel to Morrissey Auxiliary Lanes Project, as described in Sections 4.1, 4.2, and 4.3 of this Report will be minimized with implementation of construction Site BMPs. Caltrans will require its contractor to implement a SWPPP to comply with the conditions of the Caltrans NPDES permit and to address the temporary

water quality impacts resulting from construction activities associated with this Soquel to Morrissey Auxiliary Lanes Project. Since the Build Alternative will involve soil disturbance of more than 1 acre, (0.4 hectares), a Notification of Construction under the Caltrans NPDES permit will also need to be filed with the RWQCB.

The SWPPP will be submitted by the contractor and approved by Caltrans prior to start of construction. It is intended to address construction-phase impacts. The SWPPP required for this Soquel to Morrissey Auxiliary Lanes Project will include the following elements:

- Soquel to Morrissey Auxiliary Lanes Project Description - The Soquel to Morrissey Auxiliary Lanes Project description will include maps and other information related to construction activities and potential sources of pollutants.
- Minimum Construction Control Measures - These measures may include limiting construction access routes, stabilization of areas denuded by construction, and using sediment controls and filtration.
- Erosion and Sediment Control - The SWPPP is required to contain a description of soil stabilization practices, control measures to prevent a net increase in sediment load in storm water, controls to reduce tracking sediment onto roads, and controls to reduce wind erosion.
- Non-Storm Water Management - The SWPPP will include provisions to reduce and control discharges other than storm water.
- Post-Construction Storm Water Management - The SWPPP will include a list of storm water control measures that will provide ongoing (permanent) protection for water resources.
- Waste Management and Disposal - The SWPPP will include a waste management section including equipment maintenance waste, used oil, and batteries etc. All waste must be disposed of as required by state and federal law.
- Maintenance, Inspection, and Repair - The SWPPP requires an ongoing program to ensure that all controls are in place and operating as designed.
- Monitoring - This provision requires documented inspections of the control measures.
- Reports - Caltrans will prepare an annual report on the construction of the Soquel to Morrissey Auxiliary Lanes Project and submit this report to the RWQCB which must certify compliance with the SWPPP.
- Training – Trained personnel must do inspections, maintenance, and repair of construction site BMPs
- List of Proposed Temporary Construction Site Best Management Practices as described in the next section.

5.2.2 List of Proposed Temporary Construction Site BMPs

Potential temporary impacts related to water quality can be prevented or minimized by implementing standard BMPs recommended for a particular construction activity. The selected temporary BMPs are consistent with the practices required under Caltrans' NPDES General Permit for Storm Water Discharges associated with construction activities and are intended to achieve compliance with the requirements of the permit.

Compliance with the requirements of the Permit and adherence to the conditions reduces or prevents potentially significant construction-related impacts.

Adverse impacts can occur during construction-related activities. Soil erosion, especially during heavy rainfall, can increase the suspended solids, dissolved solids, and organic pollutants in storm water runoff generated within the Soquel to Morrissey Auxiliary Lanes Project area. These conditions will likely persist until completion of construction activities and implementation of long-term erosion control measures.

The Soquel to Morrissey Auxiliary Lanes Project site is adjacent to ESAs. ESA fencing will be needed to prohibit disturbance in these areas.

Temporary creek diversions are not necessary, but it will have to be further researched during the PS&E Phase if dewatering will be needed due to anticipated high ground water conditions. Contract documents shall address any necessary permits for dewatering or appropriate measures. All work done in Waters of the US or Waters of the State will need to be scheduled according to the appropriate regulatory agency requirements.

Good housekeeping techniques will also be a requirement from the contractor for the project site. Spill protection of stored equipment and materials and spill response contingencies will have to be implemented.

Erosion control measures will be applied to all exposed areas during construction, including silt fences to trap sediments within the construction area, at the perimeter of downstream drainage points. Other methods of minimizing erosion impacts include the implementation of temporary hydromulching and limiting the amount and length of exposure of graded soil. The Caltrans PPDG describes approved erosion control BMPs (Caltrans, 2007). Temporary erosion control and water quality measures will be defined in detail in the Erosion Control and Water Pollution Control Plans (WPCP) design sheets and specifications prepared for the Soquel to Morrissey Auxiliary Lanes Project during the PS&E Phase. Table 7 shows some of the temporary control measures that will be considered for the Soquel to Morrissey Auxiliary Lanes Project, per Appendix C of the *Storm Water Quality Handbooks, Project Planning and Design Guide* (Caltrans, 2007).

Table 7. Temporary Control Measures for the Soquel to Morrissey Auxiliary Lanes Project

Category	Minimum Requirement(s)
Soil Stabilization Practices	SS-1 Scheduling
	SS-2 Preservation of Existing Vegetation
	SS-6 Straw Mulch
	SS-7 Erosion Control Blankets
	SS-10 Outlet Protection/ Velocity Dissipation Devices
Sediment Control Practices	SC-1 Silt Fence
	SC-5 Fiber Rolls
	SC-7 Boulevard Sweeping and Vacuuming
	SC-10 Storm Drain Inlet Protection
Wind Erosion Control	WE-1 Wind Erosion Control
Non-Storm Water Control	NS-2 Dewatering Operation
	NS-6 Illicit Connection/Illegal Discharge Detection and Reporting
	NS-8 Vehicle and Equipment Cleaning
	NS-9 Vehicle and Equipment Fueling
	NS-10 Vehicle and Equipment Maintenance
Waste Management & Materials Pollution Control	WM-1 Material Delivery and Storage
	WM-2 Material Use
	WM-3 Stockpile Management
	WM-4 Spill Prevention and Control
	WM-5 Solid Waste Management
	WM-8 Concrete Waste Management
	WM-9 Sanitary/Septic Waste Management
Temporary Construction Practice	TC-1 Stabilized Construction Entrance/Exit

Several other Temporary Water Quality or Construction site BMPs are listed in the Caltrans Statewide SWMP. Each of the above categories should be considered when determining Temporary BMPs.

5.2.3 List of Proposed Design Pollution Prevention Best Management Practices

Permanent erosion control impacts from all new or exposed slopes from the Soquel to Morrissey Auxiliary Lanes Project, as described in Sections 4.4 of this Report, will be minimized with implementation of Design Pollution Prevention BMPs. These BMPs include preservation of existing vegetation, slope protection systems, concentrated flow conveyance systems, and measures to address downstream effects related to potentially increased flow.

Preservation of existing vegetation at all locations is beneficial for the Soquel to Morrissey Auxiliary Lanes Project. The following general steps should be taken to preserve existing vegetation during the Design Phase (Caltrans, 2007):

- Identify and delineate in contract documents all vegetation to be retained;
- Designer should provide specification in contract documents that the Contractor shall delineate the areas to be preserved in the field prior to the start of soil-disturbing activities;
- Designer should provide specification in contract documents that the Contractor shall minimize disturbed areas by following existing contours to reduce cutting and filling; and
- Designer should, when specifying the removal of vegetation, consider provisions included in the contract documents to minimize impacts (increased exposure or wind damage) to the adjacent vegetation that will be preserved.

For all new or exposed slopes, increased sediment loads may be transported to downstream waterways; therefore, permanent erosion control measures should be applied (Caltrans, 2007). Necessary erosion control measures for slope protection will be applied to unlined channels or ditches, as well as to unpaved side slopes where sheet flow is considered. Applicable vegetative Slope Protection BMPs for the Soquel to Morrissey Auxiliary Lanes Project include hydroseeding and erosion control netting. Hard surface erosion control measures include gore paving, or slope paving under bridges.

Concentrated flow conveyance systems are also required to be considered as part of the design goal for the Soquel to Morrissey Auxiliary Lanes Project. These measures address increase in runoff when a project has a potential to create water gullies due to creation or modification of existing slopes, concentrated surface runoff and new cross drains. Each of these conditions will require the proper design of these drainage facilities to handle concentrated flows, for example:

- Ditches, berms, dikes, or swales
- Overside drains

- Flared end sections
- Outlet protection/velocity dissipation devices

In addition, the Soquel to Morrissey Auxiliary Lanes Project will have to implement measures to address downstream effects related to potentially increased flow.

Overall, the design goal of the project will be to maintain pre-construction storm water discharge flows by metering or detaining these flows to preconstruction rates prior to discharge to a receiving water body or Municipal Separate Storm Sewer Systems (MS4). By meeting this goal and after incorporating NPDES requirements, the Soquel to Morrissey Auxiliary Lanes Project team does not anticipate a significant water quality impact for storm water discharges.

5.2.4 List of Proposed Treatment Best Management Practices

This Soquel to Morrissey Auxiliary Lanes Project is considering Treatment BMPs because it is anticipated to result in a net increase of more than 1 acre (0.4 hectares) of impervious area, and it is located within an urban MS4 area. Incorporation of Treatment BMPs in the design of all new or major reconstruction highway projects is required under Section 4.4 of the Caltrans SWMP. The following is a list of Treatment BMPs that are considered most feasible for this Soquel to Morrissey Auxiliary Lanes Project:

- Biofiltration swales and strips
- Detention devices
- Multi-Chambered Treatment Trains (MCTTs)

The Soquel to Morrissey Auxiliary Lanes Project's Storm Water Data Report (SWDR), has specific details on the proposed treatment BMPs. Several site restrictions such as steep terrain, ground water depths, hydrologic soil types, dense vegetation, wetlands and other Waters of the US near the area (or ESAs) were considered for the feasibility of treatment BMPs. Caltrans' design criterion was also carefully studied and the results indicate that some treatment BMPs are deemed infeasible for the project. Specific information, including the sizes of Treatment BMPs, will be completed in the PS&E Phase, or, as more detailed information is available regarding the Soquel to Morrissey Auxiliary Lanes Project design. General consideration and locations of Treatment BMPs are shown in the Soquel to Morrissey Auxiliary Lanes Project's SWDR (2008).

5.3 Water Quality Assessment Checklist

This Water Quality Assessment Checklist is a summary of the storm water quality evaluation process presented in the State California Environmental Quality Act (CEQA) Environmental Checklist Form.

The following list of questions is from the Hydrology and Water Quality Checklist from Section 8 of the CEQA Environmental Checklist Form. The possible answers are: “Potentially Significant Impact,” “Less than Significant with Mitigation Incorporated,” “Less than Significant Impact,” and “No Impact.”

Would the Soquel to Morrissey Auxiliary Lanes Project:

- a) *Violate any water quality standards or waste discharge requirements?*

Less than Significant Impact

The primary potential impact to water quality is soil erosion or suspended solids being introduced into the waterways. The proposed Soquel to Morrissey Auxiliary Lanes Project has a soil disturbance of more than 1 acre (0.4 ha), and therefore shall be regulated under the General NPDES Permit for Construction Activities (Order No. 99-08-DWQ, NPDES No. CAS000002). This Construction General Permit is also referenced in Caltrans’ NPDES Permit, from the SWRCB (Order No. 99-06-DWQ, NPDES No. CAS000003). Storm water discharges from Caltrans’ transportation properties, facilities, and activities are regulated through this Permit. Minimization measures shall comply with the Department’s NPDES permit. These measures include requiring the contractor to submit a SWPPP prior to start of construction and implementing permanent BMPs, such as erosion control and treatment BMPs, to address long-term impacts, of sediment and suspended solids from entering the waterways. Therefore, the proposed Soquel to Morrissey Auxiliary Lanes Project would comply with all water quality standards and waste discharge requirements, and the impact to water quality would be less than significant.

- b) *Substantially deplete ground water supplies or interfere substantially with ground water recharge such that there would be a net deficit in aquifer volume or a lowering of the local ground water table level (e.g., the production rate of preexisting nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?*

Less than Significant Impact

Ground water recharge is reduced when the ground is compacted or when it is covered completely (by development) and less water can seep into the soil. The additional impervious area for the project is small relative to the size of the ground water basin located within the Soquel to Morrissey Auxiliary Lanes Project limits; therefore, ground water recharge is not anticipated to be affected by the reduction of impervious surface area. The additional impervious area is 1.75 acres (0.72 ha). Since ground water resources in the area do not represent a sole source aquifer, and since the distance to a ground water well recharge area is not near the Soquel to Morrissey Auxiliary Lanes Project, no significant impacts to water quality in ground water wells are anticipated. Implementing permanent Treatment BMPs—such as biofiltration strips and swales to the MEP will also promote infiltration within the Soquel to Morrissey Auxiliary Lanes Project limits.

c) *Substantially alter the existing drainage pattern of the site area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site?*

Less Than Significant Impact

While existing culverts may be extended or replaced to accommodate the wider roadway, there would be no proposed changes to the existing drainage pattern. The Soquel to Morrissey Auxiliary Lanes Project's design goal is to maintain pre-construction storm water discharge flows by metering or detaining these flows to preconstruction rates prior to discharge to a receiving water body or MS4 system. No stream or river would be altered such that substantial erosion or siltation would result. The objective of the drainage design is to limit the design water surface elevations and velocities to no greater than the existing conditions, or to what can be handled by the existing conditions, at the boundary of the proposed Soquel to Morrissey Auxiliary Lanes Project.

In addition the following permits would be required for impacts to drainages within jurisdictional areas: a USACOE 404 permit, 401 water quality certification from the RWQCB, and a Streambed Alteration Agreement (SAA) from California Department of Fish and Game (CDFG). All permit requirements would ensure a less than significant impact to drainage patterns onsite to minimize environmental impacts. Long term erosion and sediment controls will be addressed with the Design Permanent Treatment BMPs. Short term erosion and sediment controls will be addressed with the Construction Site BMPs. These BMPs will be implemented to ensure that sediment potential will not increase.

d) *Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?*

Less Than Significant Impact

Existing drainage patterns would be perpetuated. While the proposed Soquel to Morrissey Auxiliary Lanes Project would introduce additional impervious surface area, the effect on the flow rate and amount of surface runoff would be negligible in comparison to the overall watershed of the receiving water bodies, the new drainage systems would be designed to accommodate increase peak flows, and would not result in any flooding.

e) *Create or contribute runoff water which would exceed the capacity of existing or planned storm water drainage systems or provide substantial additional sources of polluted runoff?*

Less than Substantial

The proposed Soquel to Morrissey Auxiliary Lanes Project would add 1.75 acres (0.72 ha) total impervious surface within the proposed Soquel to Morrissey Auxiliary Lanes Project limits and, therefore, would increase the volume of storm water runoff. Potential sources of pollutants from the right-of-way include: total suspended solids, nutrients,

pesticides, particulate metals, dissolved metals, pathogens, litter, biochemical oxygen demand, and total dissolved solids. Existing drainage facilities throughout the proposed Soquel to Morrissey Auxiliary Lanes Project limits, will need to be extended replaced, or upsized to accommodate the project's impacts. Additional culverts may also be necessary to collect storm water runoff collected in front of new retaining and sound walls. In compliance with Caltrans' NPDES requirements, water quality treatment BMPs will be included where feasible and practicable to treat storm water runoff. Treatment BMPs to be considered include infiltration devices, detention basins, media filters, biofiltration swales or strips, and multi-chamber treatment trains at various locations throughout the proposed Soquel to Morrissey Auxiliary Lanes Project area. Asphalt Concrete dikes will not be used for areas with side slopes flatter than 1:4. This will allow the pavement runoff to flow across the vegetated slopes, and flow in the vegetated swales along the highway. The Soquel to Morrissey Auxiliary Lanes Project's design goal is to maintain pre-construction storm water discharge flows by metering or detaining these flows to preconstruction rates prior to discharge to a receiving water body or MS4 system. The impact to runoff, therefore, would be less than significant.

f) *Otherwise substantially degrade water quality?*

Less than Significant Impact

The primary potential impact to water quality is soil erosion or the introduction of suspended solids and into the waterways. The proposed Soquel to Morrissey Auxiliary Lanes Project has a soil disturbance of more than 1 acre (0.4 ha), and therefore, shall be regulated under the General NPDES Permit for Construction Activities (Order No. 99-08-DWQ, NPDES No. CAS000002). This Construction General Permit is also referenced in Caltrans' NPDES Permit, from the SWRCB (Order No. 99-06-DWQ, NPDES No. CAS000003). Storm water discharges from Caltrans' transportation properties, facilities, and activities are regulated through this Permit. The Soquel to Morrissey Auxiliary Lanes Project would implement water quality minimization measures that comply with the Department's NPDES permit such as requiring the contractor to submit a SWPPP prior to start of construction, and implementing permanent BMPs such as erosion control and treatment BMPs to address long-term impacts. These BMPs will control sediment and suspended solids from entering the waterways. Therefore, the proposed Soquel to Morrissey Auxiliary Lanes Project would comply with all water quality standards and waste discharge requirements, and the impact to water quality would be less than significant.

6 PERMITS AND COORDINATION

Permits from the following listed regulatory agencies and coordination with the listed local agencies are anticipated. Some of the agencies that issue these permits have differing jurisdiction over all or specific parts of the Soquel to Morrissey Auxiliary Lanes Project, depending on the resources present at any given location. Therefore, specific permit jurisdiction and requirements will be determined at the time applications are prepared or sought.

- Department of Fish and Game, 1600-1607 Permit (Streambed Alteration Agreement) - Required for all work in streams.
- RWQCB, 401 Permit (Water Quality Certification)
- USACOE – Compensatory mitigation may be required for impacts to USACE
- Caltrans
- City of Santa Cruz
- County of Santa Cruz

The Arana Gulch Watershed Alliance is a focus group on watershed priorities and also looks out for wetland restoration and enhancement at Arana Gulch. Coordination with this group is also anticipated at the design phase.

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Appendix A Water Quality Objectives

Appendix A.1 Objectives for all Inland Surface Waters, Enclosed Bays, and Estuaries

GENERAL OBJECTIVES

The following objectives apply to all inland surface waters, enclosed bays, and estuaries of the basin:

Color

Waters shall be free of coloration that causes nuisance or adversely affects beneficial uses. Coloration attributable to materials of waste origin shall not be greater than 15 units or 10 percent above natural background color, whichever is greater.

Tastes and Odors

Waters shall not contain taste or odor producing substances in concentrations that impart undesirable tastes or odors to fish flesh or other edible products of aquatic origin, that cause nuisance, or that adversely affect beneficial uses.

Floating Material

Waters shall not contain floating material, including solids, liquids, foams, and scum, in concentrations that cause nuisance or adversely affect beneficial uses.

Suspended Material

Waters shall not contain suspended material in concentrations that cause nuisance or adversely affect beneficial uses.

Settleable Material

Waters shall not contain settleable material in concentrations that result in deposition of material that causes nuisance or adversely affects beneficial uses.

Oil and Grease

Waters shall not contain oils, greases, waxes, or other similar materials in concentrations that result in a visible film or coating on the surface of the water or on objects in the water, that cause nuisance, or that otherwise adversely affect beneficial uses.

Biostimulatory Substances

Waters shall not contain biostimulatory substances in concentrations that promote aquatic growths to the extent that such growths cause nuisance or adversely affect beneficial uses.

Sediment

The suspended sediment load and suspended sediment discharge rate of surface waters shall not be altered in such a manner as to cause nuisance or adversely affect beneficial uses.

Turbidity

Waters shall be free of changes in turbidity that cause nuisance or adversely affect beneficial uses.

Increase in turbidity attributable to controllable water quality factors shall not exceed the following limits:

1. Where natural turbidity is between 0 and 50 Jackson Turbidity Units (JTU), increases shall not exceed 20 percent.
2. Where natural turbidity is between 50 and 100 JTU, increases shall not exceed 10 JTU.
3. Where natural turbidity is greater than 100 JTU, increases shall not exceed 10 percent.

Allowable zones of dilution within which higher concentrations will be tolerated will be defined for each discharge in discharge permits.

pH

For waters not mentioned by a specific beneficial use, the pH value shall not be depressed below 7.0 or raised above 8.5.

Dissolved Oxygen

For waters not mentioned by a specific beneficial use, dissolved oxygen concentration shall not be reduced below 5.0 mg/l at any time. Median values should not fall below 85 percent saturation as a result of controllable water quality conditions.

Temperature

Temperature objectives for Enclosed Bays and Estuaries are as specified in the "Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California" including any revisions thereto.

Natural receiving water temperature of intrastate waters shall not be altered unless it can be demonstrated to the satisfaction of the Regional Board that such alteration in temperature does not adversely affect beneficial uses.

Toxicity

All waters shall be maintained free of toxic substances in concentrations which are toxic to, or which produce detrimental physiological responses in, human, plant, animal, or aquatic life. Compliance with this objective will be determined by use of indicator organisms, analyses of species diversity, population density, growth anomalies, toxicity bioassays of appropriate duration, or other appropriate methods as specified by the Regional Board.

Survival of aquatic life in surface waters subjected to a waste discharge or other controllable water quality conditions, shall not be less than that for the same water body in areas unaffected by the waste discharge or, when necessary, for other control water that is consistent with the requirements for "experimental water" as described in Standard Methods for the Examination of Water and Wastewater, latest edition. As a minimum, compliance with this objective shall be evaluated with a 96 hour bioassay.

In addition, effluent limits based upon acute bioassays of effluents will be prescribed where appropriate, additional numerical receiving water objectives for specific toxicants will be established as sufficient data become available, and source control of toxic substances is encouraged.

The discharge of wastes shall not cause concentrations of unionized ammonia (NH₃) to exceed 0.025 mg/l (as N) in receiving waters.

Pesticides

No individual pesticide or combination of pesticides shall reach concentrations that adversely affect beneficial uses. There shall be no increase in pesticide concentrations found in bottom sediments or aquatic life.

For waters where existing concentrations are presently nondetectable or where beneficial uses would be impaired by concentrations in excess of nondetectable levels, total identifiable chlorinated hydrocarbon pesticides shall not be present at concentrations detectable within the accuracy of analytical methods prescribed in Standard Methods for the Examination of Water and Wastewater, latest edition, or other equivalent methods approved by the Executive Officer.

Chemical Constituents

Where wastewater effluents are returned to land for irrigation uses, regulatory controls shall be consistent with Title 22 of the California Code of Regulations and other relevant local controls.

Other Organics

Waters shall not contain organic substances in concentrations greater than the following:

Methylene Blue	
Activated Substances	0.2 mg/l
Phenols	0.1 mg/l
PCB's	0.3 mg/l
Phthalate Esters	0.002 mg/l

Radioactivity

Radionuclides shall not be present in concentrations that are deleterious to human, plant, animal, or aquatic life; or result in the accumulation of radionuclides in the food web to an extent which presents a hazard to human, plant, animal, or aquatic life.

Table 3-7. Surface Water Quality Objectives, mg/l^a

Sub-Basin/Sub-Area	TDS	Cl	SO ₄	B	Na
Santa Ynez					
Cachuma Reservoir	600	20	220	0.4	50
Solvang	700	50	250	0.4	60
Lompoc	1000	100	350	0.4	100
Santa Maria					
Cuyama River (Near Garey)	900	50	400	0.3	70
Sisquoc River (Near Garey)	600	20	250	0.2	50
Estero Bay					
Santa Rosa Creek	500	50	80	0.2	50
Chorro Creek	500	50	50	0.2	50
San Luis Obispo Creek	650	100	100	0.2	50
Arroyo Grande Creek	800	50	200	0.2	50
Salinas River					
Salinas River					
Above Bradley	250	20	100	0.2	20
Above Spreckles	600	80	125	0.2	70
Gabilan Tributary	300	50	50	0.2	50
Diablo Tributary	1200	80	700	0.5	150
Nacimiento River	200	20	50	0.2	20
San Antonio River	250	20	80	0.2	20
Carmel River	200	20	50	0.2	20
Monterey Coastal					
Big Sur River	200	20	20	0.2	20
Pajaro River					
at Chittenden	1000	250	250	1.0	200
San Benito River	1400	200	350	1.0	250
Llagas Creek	200	10	20	0.2	20
Big Basin					
Boulder Creek	150	10	10	0.2	20
Zayante Creek	500	50	100	0.2	40
San Lorenzo River					
Above Bear Creek	400	60	80	0.2	50
At Tait Street Check Dam	250	30	60	0.2	25

^a Objectives shown are annual mean values. Objectives are based on preservation of existing quality or water quality enhancement believed attainable following control of point sources

TDS Total Dissolved Solids
 CL Chloride
 SO₄ Sulfate
 B Boron
 NA Sodium

OBJECTIVES FOR ALL INLAND SURFACE WATERS, ENCLOSED BAYS, AND ESTUARIES BASED ON BENEFICIAL USES:

Municipal and Domestic Supply (MUN)

pH

The pH value shall neither be depressed below 6.5 nor raised above 8.3.

Organic Chemicals

All inland surface waters, enclosed bays, and estuaries shall not contain concentrations of organic chemicals in excess of the limiting concentrations set forth in California Code of Regulations, Title 22, Chapter 15, Article 5.5, Section 64444.5, Table 5 and listed in Table 3-1.

Chemical Constituents

Waters shall not contain concentrations of chemical constituents in excess of the limits specified in California Code of Regulations, Title 22, Article 4, Chapter 15, Section 64435, Tables 2 and 3 as listed in Table 3-2.

Phenol

Waters shall not contain phenol concentrations in excess of 1.0 mg/l.

Radioactivity

Waters shall not contain concentrations of radionuclides in excess of the limits specified in California Code of Regulations, Title 22, Chapter 15, Article 5, Sections 64441 and 64443, Table 4.

Agricultural Supply (AGR)

pH

The pH value shall neither be depressed below 6.5 nor raised above 8.3.

Dissolved Oxygen

Dissolved oxygen concentration shall not be reduced below 2.0 mg/l at any time.

Chemical Constituents

Waters shall not contain concentrations of chemical constituents in amounts which adversely affect the agricultural beneficial use. Interpretation of adverse effect shall be as derived from the University of California Agricultural Extension Service guidelines provided in Table 3 3. In addition, waters used for irrigation and livestock watering shall not exceed concentrations for those chemicals listed in Table 3 4. Salt concentrations for irrigation waters shall be controlled through implementation of the anti-degradation policy to the effect that mineral constituents of currently or potentially usable waters shall not be increased. It is emphasized that no controllable water quality factor shall degrade the quality of any ground water resource or adversely affect long-term soil productivity.

Where wastewater effluents are returned to land for irrigation uses, regulatory controls shall be consistent with Title 22 of the California Code of Regulations and with relevant controls for local irrigation sources.

Water Contact Recreation (REC-1)

pH

The pH value shall neither be depressed below 6.5 nor raised above 8.3.

Bacteria

Fecal coliform concentration, based on a minimum of not less than five samples for any 30 day period, shall not exceed a log mean of 200/100 ml, nor shall more than ten percent of total samples during any 30 day period exceed 400/100 ml.

Non-Contact Water Recreation (REC-2)

pH

The pH value shall neither be depressed below 6.5 nor raised above 8.3.

Bacteria

Fecal coliform concentration, based on a minimum of not less than five samples for any 30-day period, shall not exceed a log mean of 2000/100 ml, nor shall more than ten percent of samples collected during any 30-day period exceed 4000/100 ml.

Cold Freshwater Habitat (COLD)

pH

The pH value shall not be depressed below 7.0 or raised above 8.5. Changes in normal ambient pH levels shall not exceed 0.5 in fresh waters.

Dissolved Oxygen

The dissolved oxygen concentration shall not be reduced below 7.0 mg/l at any time.

Temperature

At no time or place shall the temperature be increased by more than 5oF above natural receiving water temperature.

Chemical Constituents

Waters shall not contain concentrations of chemical constituents known to be deleterious to fish or wildlife in excess of the limits listed in Table 3-5.

Warm Freshwater Habitat (WARM)

pH

The pH value shall not be depressed below 7.0 or raised above 8.5. Changes in normal ambient pH levels shall not exceed 0.5 in fresh waters.

Dissolved Oxygen

The dissolved oxygen concentration shall not be reduced below 5.0 mg/l at any time.

Temperature

At no time or place shall the temperature of any water be increased by more than 5oF above natural receiving temperature.

Chemical Constituents

Waters shall not contain concentrations of chemical constituents known to be deleterious to fish or wildlife in excess of the limits listed in Table 3-5.

Fish Spawning (SPWN)

Cadmium

Cadmium shall not exceed .003 mg/l in hard water or .0004 mg/l in soft water at any time. (Hard water is defined as water exceeding 100 mg/l CaCO₃.)

Dissolved Oxygen

The dissolved oxygen concentration shall not be reduced below 7.0 mg/l at any time.

Marine Habitat (MAR)

pH

The pH value shall not be depressed below 7.0 or raised above 8.5. Changes in normal ambient pH levels shall not exceed 0.2 units.

Dissolved Oxygen

The dissolved oxygen concentration shall not be reduced below 7.0 mg/l at any time.

Chemical Constituents

Waters shall not contain concentrations of chemical constituents known to be deleterious to fish or wildlife in excess of limits listed in Table 3-6.

Shellfish Harvesting (SHELL)

Chromium

The maximum permissible value for waters designated SHELL shall be 0.01 mg/l.

Bacteria

At all areas where shellfish may be harvested for human consumption, the median total coliform concentration throughout the water column for any 30-day period shall not exceed 70/100 ml, nor shall more than ten percent of the samples collected during any 30-day period exceed 230/100 ml for a five-tube decimal dilution test or 330/100 ml when a three-tube decimal dilution test is used.

OBJECTIVES FOR GROUND WATER

GENERAL OBJECTIVES

The following objectives apply to all ground waters of the basin.

Tastes and Odors

Ground waters shall not contain taste or odor producing substances in concentrations that adversely affect beneficial uses.

Radioactivity

Radionuclides shall not be present in concentrations that are deleterious to human, plant, animal, or aquatic life; or result in the accumulation of radionuclides in the food web to an extent which presents a hazard to human, plant, animal, or aquatic life.

Median Ground Water Objectives, mg/l^a

Table 3-8. Median Ground Water Objectives for specific ground waters within Soquel to Morrissey Auxiliary Lanes Project Study Area

Sub-basin/Sub-Area	TDS	Cl	SO ₄	B	Na	N _b
Big Basin						
Near Felton	100	20	10	0.2	10	1
Near Boulder Creek	250	30	50	0.2	20	5

a Objectives shown are median values based on data averages; objectives are based on preservation of existing quality or water quality enhancement believed attainable following control of point sources.

b Measured as Nitrogen

c Basis for objectives is in the "Water Quality Objectives for the Santa Maria Ground Water Basin Revised Staff Report, May 1985" and February 1986, Staff Report.

d These are maximum objectives in accordance with Title 22 of the Code of Regulations.

e Ground water basin currently exceeds usable mineral quality.

f Ground water basin boundary map available in appendix.

g Basis for objectives is in the report "A Study of the Paso Robles Ground Water Basin to Establish Best Management Practices and Establish Salt Objectives", Coastal Resources Institute, June 1993.

h Standard exceeds California Secondary Drinking Water Standards contained in Title 22 of the Code of Regulations. Water quality standard is based upon existing water quality. If water quality degradation occurs, the Regional Board may consider salt limits on appropriate discharges.

Appendix B Beneficial Uses

Definitions of Beneficial Uses

Beneficial uses for surface and ground waters are divided into the twenty standard categories listed below. One of the principal purposes of this standardization is to facilitate establishment of both qualitative and numerical water quality objectives that will be compatible on a statewide basis.

Municipal and Domestic Supply (MUN)

Uses of water for community, military, or individual water supply systems including, but not limited to, drinking water supply. According to State Board Resolution No. 88-63, "Sources of Drinking Water Policy" all surface waters are considered suitable, or potentially suitable, for municipal or domestic water supply except where:

- a. TDS exceeds 3000 mg/l (5000 uS/cm electrical conductivity);
- b. Contamination exists, that cannot reasonably be treated for domestic use;
- c. The source is not sufficient to supply an average sustained yield of 200 gallons per day;
- d. The water is in collection or treatment systems of municipal or industrial wastewaters, process waters, mining wastewaters, or storm water runoff; and;
- e. The water is in systems for conveying or holding agricultural drainage waters.

Agricultural Supply (AGR)

Uses of water for farming, horticulture, or ranching including, but not limited to, irrigation, stock watering, or support of vegetation for range grazing.

Industrial Process Supply (PROC)

Uses of water for industrial activities that depend primarily on water quality (i.e., waters used for manufacturing, food processing, etc.).

Industrial Service Supply (IND)

Uses of water for industrial activities that do not depend primarily on water quality including, but not limited to, mining, cooling water supply, hydraulic conveyance, gravel washing, fire protection, or oil well repressurization.

Ground Water Recharge (GWR)

Uses of water for natural or artificial recharge of ground water for purposes of future extraction, maintenance of water quality, or halting of saltwater intrusion into freshwater aquifers. Ground water recharge includes recharge of surface water underflow.

Freshwater Replenishment (FRSH)

Uses of water for natural or artificial maintenance of surface water quantity or quality (e.g., salinity) which includes a water body that supplies water to a different type of water body, such as, streams that supply reservoirs and lakes, or estuaries; or reservoirs and lakes that supply streams. This includes only immediate upstream water bodies and not their tributaries.

Navigation (NAV)

Uses of water for shipping, travel, or other transportation by private, military, or commercial vessels. This Board interprets NAV as, "Any stream, lake, arm of the sea, or other natural body of water that is actually navigable and that, by itself, or by its connections with other waters, for a period long enough to be of commercial value, is of sufficient capacity to float watercraft for the purposes of commerce, trade, transportation, and including pleasure; or any waters that have been declared navigable by the Congress of the United States" and/or the California State Lands Commission.

Hydropower Generation (POW)

Uses of water for hydropower generation.

Water Contact Recreation (REC-1)

Uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, white water activities, fishing, or use of natural hot springs.

Non-Contact Water Recreation (REC-2)

Uses of water for recreational activities involving proximity to water, but not normally involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating tidepool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities.

Commercial and Sport Fishing (COMM)

Uses of water for commercial or recreational collection of fish, shellfish, or other organisms including, but not limited to, uses involving organisms intended for human consumption or bait purposes.

Aquaculture (AQUA)

Uses of water for aquaculture or mariculture operations including, but not limited to, propagation, cultivation, maintenance, or harvesting of aquatic plants and animals for human consumption or bait purposes.

Warm Fresh Water Habitat (WARM)

Uses of water that support warm water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.

Cold Fresh Water Habitat (COLD)

Uses of water that support cold water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish or wildlife, including invertebrates.

Inland Saline Water Habitat (SAL)

Uses of water that support inland saline water ecosystems including, but not limited to, preservation or enhancement of aquatic saline habitats, vegetation, fish, or wildlife, including invertebrates. Soda Lake is a saline habitat typical of desert lakes in inland sinks.

Estuarine Habitat (EST)

Uses of water that support estuarine ecosystems including, but not limited to, preservation or enhancement of estuarine habitats, vegetation, fish, shellfish, or wildlife (e.g., estuarine mammals, waterfowl, shorebirds). An estuary is generally described as a semi-enclosed body of water having a free connection with the open sea, at least part of the year and within which the seawater is diluted at least seasonally with fresh water drained from the land. Included are water bodies which would naturally fit the definition if not controlled by tidegates or other such devices.

Marine Habitat (MAR)

Uses of water that support marine ecosystems including, but not limited to, preservation or enhancement of marine habitats, vegetation such as kelp, fish, shellfish, or wildlife (e.g., marine mammals, shorebirds).

Wildlife Habitat (WILD)

Uses of water that support terrestrial ecosystems including, but not limited to, preservation and enhancement of terrestrial habitats, vegetation, wildlife (e.g., mammals, birds, reptiles, amphibians, invertebrates), or wildlife water and food sources.

Preservation of Biological Habitats of Special Significance (BIOL)

Uses of water that support designated areas or habitats, such as established refuges, parks, sanctuaries, ecological reserves, or Areas of Special Biological Significance (ASBS), where the preservation or enhancement of natural resources requires special protection.

Rare, Threatened, or Endangered Species (RARE)

Uses of water that support habitats necessary, at least in part, for the survival and successful maintenance of plant or animal species established under state or federal law as rare, threatened, or endangered.

Migration of Aquatic Organisms (MIGR)

Uses of water that support habitats necessary for migration or other temporary activities by aquatic organisms, such as anadromous fish.

Spawning, Reproduction, and/or Early Development (SPWN)

Uses of water that support high quality aquatic habitats suitable for reproduction and early development of fish.

Shellfish Harvesting (SHELL)

Uses of water that support habitats suitable for the collection of filter-feeding shellfish (e.g., clams, oysters, and mussels) for human consumption, commercial, or sport purposes. This includes waters that have in the past, or may in the future, contain significant shellfisheries.

Areas of Special Biological Significance (ASBS)

are those areas designated by the State Water Resources Control Board as requiring protection of species or biological communities to the extent that alteration of natural water quality is undesirable.

The following areas have been designated Areas of Special Biological Significance in the Central Coastal Basin:

1. Ano Nuevo Point and Island, San Mateo County
2. Pacific Grove Marine Gardens Fish Refuge and Hopkins Marine Life Refuge, Monterey County
3. Point Lobos Ecological Reserve, Monterey County
4. Carmel Bay, Monterey County
5. Julia Pfeiffer Burns Underwater Park, Monterey County
6. Ocean area surrounding the mouth of Salmon Creek, Monterey County
7. Channel Islands, Santa Barbara County - San Miguel, Santa Rosa, Santa Cruz

An ASBS designation implies the following requirements:

- Discharge of elevated temperature wastes in a manner that would alter water quality conditions from those occurring naturally will be prohibited.
- Discharge of discrete, point source sewage or industrial process wastes in a manner that would alter water quality conditions from those occurring naturally will be prohibited.
- Discharge of waste from nonpoint sources, including but not limited to storm water runoff, silt, and urban runoff, will be controlled to the extent practicable. In control programs for waste from nonpoint sources, Regional Boards will give high priority to areas tributary to ASBS.
- Further information concerning ASBS areas can be found by reviewing Regional Board Policies in Chapter Five.

Appendix C Central Coast Hydrologic Region Ground Water Data

**Appendix C.1 Central Coast Hydrologic Region Groundwater Data
(From the Department of Water Resources, State of
California)**

Table 21 Central Coast Hydrologic Region groundwater data

Basin/Subbasin	Basin Name	Area (acres)	Groundwater Budget Type	Well Yields (gpm)		Types of Monitoring			TDS (mg/L)	
				Maximum	Average	Levels	Quality	Title 22	Average	Range
3-1	SOQUEL VALLEY	2,500	C	1,421	665	6	6	16	482	270-990
3-2	PAJARO VALLEY	76,800	A	2,000	500	185	185	149	580-910	300-30,000
3-3	GILROY-HOLLISTER VALLEY									
3-3.01	LLAGAS AREA	55,600	C	-	-	-	-	95	-	-
3-3.02	BOLSA AREA	21,000	A	-	400	11	<11	3	-	400-1800
3-3.03	HOLLISTER AREA	32,700	A	-	400	42	<42	35	-	400-1600
3-3.04	SAN JUAN BAUTISTA AREA	74,300	A	-	400	37	<37	40	-	460-1700
3-4	SALINAS VALLEY									
3-4.01	180/400 FOOT AQUIFER	84,400	A	-	-	166	218	82	478	223-1,013
3-4.02	EAST SIDE AQUIFER	57,500	A	-	-	74	67	53	450	168-977
3-4.04	FOREBAY AQUIFER	94,100	A	-	-	89	91	35	624	300-1,100
3-4.05	UPPER VALLEY AQUIFER	98,200	A	4,000	-	36	37	17	443	140-3,700
3-4.06	PASO ROBLES AREA	597,000	A	3,300	-	183	-	58	614	165-3,868
3-4.08	SEASIDE AREA	25,900	B	3,500	1,000		7	24	400	200-900
3-4.09	LANGLEY AREA	15,400	B	1,570	450	-	-	52	-	52-348
3-4.10	CORRAL DE TIERRA AREA	22,300	C	948	450	-	3	26	-	355-679
3-5	CHOLAME VALLEY	39,800	C	3,000	1,000	1	-	1	-	-
3-6	LOCKWOOD VALLEY	59,900	C	1,500	100	-	-	9	-	-
3-7	CARMEL VALLEY	5,160	C	1,000	600	50	23	12	260-670	220-1,200
3-8	LOS OSOS VALLEY	6,990	A	700	230	-	-	10	354	78-33,700
3-9	SAN LUIS OBISPO VALLEY	12,700	A	600	300	-	-	11	583	278-1,949
3-12	SANTA MARIA RIVER VALLEY	184,000	A	2,500	1,000	286	10	108	598	139-1,200
3-13	CUYAMA VALLEY	147,000	A	4,400	1,100	17	2	8	-	206-3,905
3-14	SAN ANTONIO CREEK VALLEY	81,800	A	-	400	30	-	9	415	129-8,040
3-15	SANTA YNEZ RIVER VALLEY	204,000	A	1,300	750	163	21	76	507	400-700
3-16	GOLETA	9,210	A	800	500	49	11	17	755	617-929
3-17	SANTA BARBARA	6,160	A	625	560	75	36	5	-	217-385
3-18	CARPINTERIA	8,120	A	500	300	41	41	4	557	317-1,780
3-19	CARRIZO PLAIN	173,000	C	1,000	500	-	-	1	-	-
3-20	ANO NUEVO AREA	2,032	C	-	-	-	-	2	-	-
3-21	SANTA CRUZ PURISIMA FORMATION	40,200	C	200	20	-	-	39	440	380-560
3-22	SANTA ANA VALLEY	2,720	C	130	-	-	-	-	-	-
3-23	UPPER SANTA ANA VALLEY	1,430	C	-	-	-	-	-	-	-
3-24	QUIEN SABE VALLEY	4,710	C	122	122	-	-	-	-	-
3-25	TRES PINOS VALLEY	3,390	C	1,225	-	-	-	3	-	-
3-26	WEST SANTA CRUZ TERRACE	7,870	C	550	200	-	-	7	480	378-684
3-27	SCOTTS VALLEY	774	C	410	100-900	26	7	7	360	100-980
3-28	SAN BENITO RIVER VALLEY	24,200	C	2,000	-	-	-	3	-	-
3-29	DRY LAKE VALLEY	1,420	C	-	-	-	-	-	-	-
3-30	BITTER WATER VALLEY	32,200	C	-	-	-	-	-	-	-
3-31	HERNANDEZ VALLEY	2,860	C	160	58	-	-	-	-	-